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WESTERN WATER BULLETIN 1989

Flow of The Colorado River and other Western Boundary Streams and Related Data

COLORADO RIVER

TIJUANA RIVER

SANTA CRUZ RIVER

SAN PEDRO RIVER

WHITEWATER DRAW

1989

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QUANTITY OF WATER

CLIMATOLOGICAL DATA

FOREWORD

This bulletin is the thirtieth annual compilation of stream discharges and other hydrographic data relating to international aspects of the Colorado River below Imperial Dam, the Tijuana River, and other streams crossing the western land boundary of the United States and Mexico. The compilation was prepared jointly by the United States and Mexican Sections of the International Boundary and Water Commission, solely for the purpose of presenting statistical data relating to stream flow and kindred subjects for the Colorado River from Imperial Dam to the Gulf of California, the Tijuana River and its important tributaries in the United States and Mexico, and other streams, including the Alamo and New Rivers which cross the California-Baja California boundary, and the Santa Cruz River and Whitewater Draw which cross the Arizona-Sonora boundary. This bulletin contains information for the year 1989.

Stream gaging on the Colorado River below Imperial Dam began in 1902 when the station at Yuma, Arizona was established. Stage records were obtained at this station from January 1878 until December 1973, when it was discontinued. Continuous stream gaging on the Tijuana River and its important tributaries in the United States and in Mexico began in 1936. Each government operates the gaging stations located within its own country.

COLORADO RIVER BELOW IMPERIAL DAM

Below Imperial Dam, the Colorado River flows southward 10 miles to the mouth of the Gila River, thence westward 11 miles to Pilot Knob Mountain, and south 1 mile to the point where the northerly international land boundary, between California and Baja California, intersects the river. From this point the river continues to flow southward and forms the boundary between the United States and Mexico for a distance of about 22 miles to the point where the southerly international land boundary between Arizona and Sonora intersects the river. From this point the river continues to flow southward about 90 miles to discharge into the Gulf of California.

The ordinary flows of Colorado River below Imperial Dam are largely controlled by releases at Hoover Dam, completed in 1935. The releases are further regulated at Davis Dam, completed in 1950, and by Parker and Imperial Dams, completed in 1938. Small amounts of runoff may occasionally be contributed to the flow in the lower river from the usually dry arroyos draining the 10,900 square miles along the river from Hoover Dam to the mouth of the Gila River. In addition, flows ranging from usually minor amounts to infrequent torrential floods may enter the lower Colorado River from the Bill Williams River, draining about 717 square miles below Alamo Dam and Lake, completed in 1963; and from the Gila River, draining about 7,300 square miles below Painted Rock Dam and Reservoir, completed in January 1960.

At Imperial Dam, diversions are made to Gila Gravity Main Canal and All-American Canal for irrigation projects in Arizona, including the Yuma Valley, Gila and Wellton-Mohawk projects; and in California, including the Imperial Valley, Coachella Valley and Reservation Division of Yuma Project. Also, under the provisions of the 1944 Water Treaty, there may be diverted to the All-American Canal at Imperial Dam for delivery to Mexico in the Alamo Canal, or substitute canal, at the northerly boundary, a portion of Mexico's scheduled deliveries of waters of the Colorado River, which in 1989 amounted to 1,700,000 acre-feet, in accordance with Article 10 of the 1944 Water Treaty. No diversions were made to a substitute canal in 1989.

Below Laguna Dam, measured and unmeasured flows are returned to the river principally as waste and drainage water from the irrigation projects in the United States. Waste and drainage waters from irrigation projects in the United States also cross the boundary into Mexico near San Luis, Arizona without returning to the river in the United States.

In the limitrophe section of the river, 1.1 miles downstream from the northerly boundary, Morelos Dam, the principal diversion structure for Mexico, was completed and placed in operation on November 8, 1950. Since that date almost all Colorado River waters diverted by Mexico (except emergency deliveries to Tijuana from August 1972 to August 1980) have been diverted to the Alamo Canal at Morelos Dam.

TIJUANA RIVER BASIN

The total drainage area of the Tijuana River basin is 1,731 square miles, of which 27 percent lies in the United States and 73 percent in Mexico. This river is formed by the principal tributaries, Cottonwood Creek, which rises in the United States and Rio de las Palmas, which rises in Mexico. Cottonwood Creek crosses the international land boundary 21 miles from the Pacific Ocean to join the Rio de Las Palmas in Mexico. From the confluence of these tributaries, the Tijuana River flows northwesterly 5 miles to cross the land boundary into the United States near San Ysidro, California and Tijuana, Baja California, and then flows westerly 6 miles to discharge into the Pacific Ocean 2 miles north of the boundary. The flow of Cottonwood Creek is partially controlled by Barrett and Morena Reservoirs in the United States, and the flow of the Rio de las Palmas is partially controlled by Rodriguez Reservoir in Mexico.

WHITEWATER DRAW NEAR DOUGLAS, ARIZONA

Whitewater Draw rises in the United States and flows south into Mexico, crossing the international boundary near Douglas, Arizona, eventually discharging into the Gulf of California through the Yaqui River in Mexico. The total drainage area above the Douglas Gaging Station is 1,023 square miles. A number of mountain streams in the upper reaches of the basin are diverted for irrigation, but they would normally sink or go to ground water before reaching the main water course.

FOREWORD

San Pedro River at Palominas, Arizona

The San Pedro River rises in Mexico and flows north into the United States, crossing the boundary near Palominas, Arizona and thence northwesterly into the Gila River. The river in the vicinity of the international boundary drains an area of 741 square miles, of which 649 square miles are in Mexico.

Santa Cruz River Near Nogales and Lochiel, Arizona

The Santa Cruz River rises in the United States and flows south into Mexico, crossing the international boundary near Lochiel, Arizona and returning to the United States near Nogales, Arizona, eventually discharging into the Gila River southwest of Phoenix, Arizona. The drainage area of the Santa Cruz River above Nogales station is 533 square miles. Of this amount, 348 square miles lie in Mexico. There are a few ground water irrigation diversions above the Lochiel station in Arizona and an unknown amount of water diverted for irrigation in Mexico.

Acknowledgments

Other agencies which have contributed to the data published herein include the Bureau of Reclamation and the Geological Survey of the U. S. Department of the Interior; the National Weather Service, Department of Commerce; the Yuma County Water Users' Association; the Imperial Irrigation District; the city of San Diego, California; the Otay Municipal Water District; and the Ministry of Agriculture and Hydraulic Resources of Mexico. Specific notation is made of each of the above named agencies, where the data appear. The courtesy and cooperation of those who have made these contributions are acknowledged with appreciation.

Units of Measure

Data collected by the Mexican Section are computed and published in a Spanish version of the water bulletin in metric units. The Mexican data are converted and reported in this bulletin in English units. Conversion factors conform generally to those in the National Bureau of Standards Miscellaneous Publication 286 "Units of Weight and Measure (United States Customary and Metric) - Definitions and Tables of Equivalents." However, for convenience some of the factors have been shortened and modified to facilitate conversion, reconversion to the original units when necessary, and checking of data. Conversion of the mean daily discharges, the monthly average discharge, and the monthly and annual volumes from metric to English units is direct. For this reason the monthly average discharge in cubic feet per second and monthly volumes in acre-feet shown for gaging stations operated by the Mexican Section cannot necessarily be obtained in the usual manner from the total monthly flow in second-foot days. For the same reason, evaporation and rainfall data, when totaled, may not be equivalent to the direct conversion from metric to English units. The following factors have been used for data in this bulletin:

METRIC UNITS	ENGLISH UNITS
LENGTHS	
1 Centimeter	0.39370 Inch
1 Meter	3.28084 Feet
1 Kilometer	0.62137 Mile
AREAS	
1 Square Meter	10.76391 Square Feet
1 Hectare	2.47105 Acres
1 Square Kilometer	0.38610 Square Mile
VOLUMES	
1 Cubic Meter	61023.74 Cubic Inches
1 Cubic Meter	35.31467 Cubic Feet
1 Cubic Meter	1.30795 Cubic Yards
1000 Cubic Meters	0.81071 Acre-Foot
1 Liter	0.26417 U.S. Gallon
WEIGHTS	
1 Kilogram	2.20462 Pounds
1 Metric Ton	2204.623 Pounds
1 Metric Ton	1.10231 Short Tons (2,000 lbs.)

Both English and metric units are used to report the figures in the descriptive headings and for the yearly figures of the annual and period summaries of all gaging station pages. The yearly figures for the summaries are obtained by direct conversion from English to metric system of units, except for those stations operated by the Mexican Section, where the figures furnished in the metric system of units are used.

GENERAL HYDROLOGIC CONDITIONS FOR 1989

COLORADO RIVER

Normally, there is no measurable amount of runoff from the portion of the Colorado River basin in the United States and Mexico below Hoover Dam, not including Bill Williams and Gila Rivers. There was no significant amount in 1989. In the lower basin of the Colorado River in Mexico, from Morelos Diversion Dam to the Gulf of California, the average precipitation during 1989 measured at 5 index stations was 0.87 inches, compared to an average of 2.68 inches during the last 31 years (1959 to 1989).

The flow of the Colorado River reaching Imperial Dam was 5,975,600 acre-feet, about 71% of the 55-year average (1935-1989) of 8,400,104 acre-feet. At the northerly international boundary, the total flow of the river during 1989 was 1,452,191 acre-feet, about 35% of the 1935-1989 average of 4,108,700 acre-feet. At the southerly international boundary, the flow during 1989 was 28,129 acre-feet, or about 9.5% of the 1935-1989 average of 2,969,030 acre-feet.

The total of all flows of the Colorado River entering Mexico in 1989 amounted to 1,728,556 acre-feet, 37% of the 1935-1989 average of 4,626,114 acre-feet, as measured 1) in the Colorado River at the northerly international boundary, 2) in the Wellton-Mohawk Main Outlet Drain Extension near Morelos Dam, 3) in the wasteways that discharge into the limitrophe section of the river from the United States bank, 4) in the canal which discharges waste and drainage waters from the Yuma Project across the southerly land boundary into Mexico near San Luis, Arizona, 5) in the Wellton-Mohawk Bypass Drain at the southerly land boundary near San Luis, Arizona, and 6) the 242 Well Field near San Luis, Arizona.

During 1989, excess waters arrived at the Mexican points of diversion and amounted to 89,983 acre-feet. These excess waters consisted mainly of releases from reservoirs on the Colorado River. A maximum instantaneous flow of 5,990 second-feet occurred in the Colorado River at the northerly boundary station on August 11, 1989.

Stored waters at the end of the year in the three major reservoirs on the Colorado River below Lee's Ferry amounted to 23,649,900 acre-feet, 83% of the usable capacity of 28,588,400 acre-feet. The greater part (21,469,000 acre-feet) of the storage was contained in Lake Mead (Hoover Dam). There were no reported shortages of Colorado River water for irrigation during 1989 due to drought or accident to the irrigation system.

The total reported acreage irrigated from waters of the Colorado River below Imperial Dam in 1989 was 1,172,696 acres; 672,981 acres in the United States and 499,715 acres in Mexico. An estimated 33% of acreage in Mexico is served by pumping from ground water.

TIJUANA RIVER BASIN

During 1989, the temperatures at Barrett Dam, California (elevation 1,750 feet) in the upper portion of the basin in the United States averaged 64.0 degrees, 2.5 degrees below the 59-year mean. In the extreme upper portion of the basin in Mexico at El Pinal, Baja California (elevation 4,429 feet), the recorded temperatures during the year averaged 55.4 degrees which equaled the long-term average; and at Rodriguez Dam, Baja California (elevation 459 feet), the recorded temperatures averaged 68.0 degrees, 4.0 degrees above the normal for many years.

At Barrett Dam in the upper portion of the basin in the United States, the recorded precipitation was 13.12 inches, 74% of normal. The recorded precipitation at El Pinal in the upper portion of the basin in Mexico, was 5.28 inches, approximately 27% of the normal during the 26-year period; and at Rodriguez Dam in the lower portion of the basin in Mexico, 2.48 inches, 27% of the 52-year average.

Runoff above Barrett and Rodriguez Reservoirs during 1989 averaged 50% of normal. Above Morena Reservoir the runoff was 3,557 acre-feet, or about 34% of the 53-year 1937-1989 mean of 10,537 acre-feet. Above Barrett Reservoir the runoff was 15,985 acre-feet, or about 130% of the 52-year 1937-1989 mean of 12,316 acre-feet. At Rodriguez Reservoir, the runoff was 329 acre-feet, or about 1.4% of the 52-year mean of 23,850 acre-feet.

The flow of the Tijuana River at the international boundary was 11,375 acre-feet during 1989.

WHITEWATER DRAW

During 1989, the average annual temperature over the watershed was 1.9 degree above normal, while the annual precipitation was 87% of normal. Runoff for the year at the gaging station near Douglas, Arizona, of 196 acre-feet, was about 3.2% of average.

GENERAL HYDROLOGIC CONDITIONS FOR 1989

San Pedro River

During 1989, the average annual temperature was 1.3 degrees above normal. The annual precipitation, as measured at Coronado National Monument Headquarters, was 43% of the 1961-1989 mean of 20.82 inches. The stream flow at Palominas, Arizona, near the international boundary was 5,127 acre-feet, 23% of the 1951-1989 average.

Santa Cruz River

During 1989, the average annual temperature over the watershed was somewhat above normal, and the annual precipitation was about 86% of the 51-year 1939-1989 mean. Runoff measured at the Nogales gaging station, where the stream re-enters the United States, was 5,444 acre-feet. The total runoff for the year measured at the gaging station near Lochiel, Arizona, where the stream enters Mexico from the United States, was 733 acre-feet. Therefore, neglecting stream flow depletions in Mexico, the records indicate a contribution of about 4,711 acre-feet from the loop of the river lying in Mexico, or approximately 87% of the flow reaching the Nogales station.

Alamo and New Rivers

During 1989, the average annual temperature over the drainage areas of the Alamo and New Rivers, as recorded at El Centro, California, was 74.0 degrees, 1.7 degrees above normal; and over the drainage area of the New River, as recorded at Mexicali, Baja California, it was 77.0 degrees, 4.0 degrees above the 64-year average.

At El Centro, the precipitation was 0.92 inches, about 34% of the 59-year average; and in Mexicali, the annual precipitation was 0.98 inches, 32% of the 64-year average. The total flow of the New River at the international boundary in 1989 was 15,438 acre-feet, which was about 139% of the 1943-1989 average.

Salton Sea

During 1989, the average annual temperature around the Salton Sea was 0.7 degree above the long-term average, while the annual precipitation recorded at Brawley, California was approximately 33% of the long-term mean of 2.65 inches. The water surface of the Salton Sea remained more or less the same during the year. The maximum stage 227.3 feet below mean sea level, was recorded on April 17-22, 1989, inclusive. The minimum stage, 228.7 feet below mean sea level, was recorded on October 25 - November 10, 1989, inclusive.

09-5300.00 RESERVATION MAIN DRAIN NO. 4 (CALIFORNIA DRAIN)

DESCRIPTION: Water-stage recorder (digital) located 500 feet (152 m) upstream from railroad culvert and one mile (1.6 km) northwest of Yuma, Arizona. Discharge measurements are made from a footbridge immediately below the gage. The drainage canal discharges into the outfall channel of the Yuma Main Canal Wasteway 200 feet (61.0 m) downstream from the spillway structure, and thence into the Colorado River on the right bank, 1,000 feet (305 m) upstream from Colorado River below Yuma Main Canal Wasteway, and 6.5 miles (10.5 km) upstream from the northerly international boundary. Prior to October 1955, published as "California Drainage Canal near Yuma, Arizona."

RECORDS: Based on current meter measurements and a continuous record of gage heights. Records are computed and furnished by the U. S. Geological Survey. Records available: Monthly discharge, January 1913 to April 1920, October 1921 to March 1925, and January 1934 to September 1947; daily and monthly discharge, October 1947 through 1989.

REMARKS: Reservation Main Drain No. 4 collects drainage and wastewater from the area east of the Yuma Main Canal on the Reservation Division of the Yuma Project, located in California. Since 1939, collection of seepage from the All-American Canal has caused large increases in drainage flows. Average annual flow prior to 1937 was 12,800 acre-feet (15,789,000 m3). Monthly and annual averages since 1937 are shown in the table below.

EXTREMES: Prior to 1937: Maximum annual flow 20,190 acre-feet (24,904,000 m3), 1916; minimum annual flow 8,920 acre-feet (11,003,000 m3), 1913.

Mean Daily Discharge in Second-Feet 1989 —— Annual and Period Summary

Day	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	52	54	64	57	58	56	63	65	55	65	88	68
2	51	55	63	56	59	60	64	65	56	72	90	66
3	52	54	65	56	58	56	64	64	54	72	92	66
4	57	54	64	59	59	55	64	65	54	74	91	64
5	56	55	65	58	60	56	66	64	57	71	91	63
6	56	54	65	58	59	56	68	69	56	69	95	67
7	52	54	65	58	59	57	66	65	55	77	89	64
8	52	56	71	64	58	57	66	65	54	74	84	62
9	50	56	65	64	58	58	66	74	55	77	83	60
10	50	56	65	59	56	60	66	138	56	78	80	61
11	60	57	66	59	55	61	65	84	57	82	79	60
12	50	56	66	60	57	60	66	87	56	80	77	61
13	52	58	69	60	57	61	67	68	57	76	74	61
14	50	59	66	62	59	63	67	81	57	80	71	64
15	51	58	65	66	55	63	67	100	58	75	72	62
16	51	57	63	70	55	64	72	69	60	76	75	62
17	52	58	64	72	54	65	69	61	58	79	79	60
18	51	57	64	73	54	65	65	62	59	76	81	61
19	53	58	63	74	56	62	64	61	62	77	82	65
20	52	58	62	73	55	58	65	60	67	80	79	83
21	53	59	63	69	55	58	66	59	79	85	79	78
22	53	59	60	68	55	58	66	58	77	87	74	75
23	54	62	60	67	57	58	70	60	73	89	73	69
24	54	61	60	66	58	59	69	58	64	89	74	70
25	53	60	59	64	59	60	68	62	74	89	70	67
26	55	59	59	65	59	60	67	60	78	86	67	67
27	56	63	58	62	59	60	71	57	86	92	66	51
28	55	62	57	61	59	61	110	57	74	98	67	44
29	56		57	58	55	61	84	58	69	93	68	54
30	55		57	58	57	62	70	58	70	93	71	60
31	56		59		55		65	61		88		59
Sum	1,650	1,609	1,949	1,896	1,769	1,790	2,126	2,115	1,887	2,499	2,361	1,974

Month	Extreme Gage Feet		ø Extreme Second-Feet				Average Second-Feet	Total Acre-Feet	Period 1937-1989 Acre-Feet		
			High		Low						
	High	Low	Day	High	Day	Low			Average	Maximum	Minimum
Jan.			11	60	! 9	50	53	3,273	3,223	4,780	877
Feb.			27	63	! 1	54	57	3,191	3,028	4,453	563
Mar.			8	71	!28	57	63	3,866	3,739	5,250	1,240
Apr.			19	74	! 2	56	63	3,761	3,741	5,250	1,160
May			5	60	!17	54	57	3,509	3,824	5,590	992
June			!17	65	4	55	60	3,550	3,698	5,580	885
July			28	110	1	63	69	4,217	3,959	6,550	816
Aug.			10	138	!27	57	68	4,195	3,970	6,810	861
Sept.			27	86	! 3	54	63	3,743	3,744	6,220	889
Oct.			28	98	1	65	81	4,957	3,844	5,740	1,040
Nov.			6	95	27	66	79	4,683	3,582	5,490	994
Dec.			20	83	28	44	64	3,915	3,432	4,960	966
Yearly				138		44	65	46,860	43,784	63,700	12,840
	Meters		Cubic Meters per Second					Thousands of Cubic Meters			
				3.91		1.25	1.84	57,801	54,007	78,573	15,838

ø Mean daily ! And other days

09-5250.00 YUMA MAIN CANAL WASTEWAY TO COLORADO RIVER AT YUMA, ARIZONA

DESCRIPTION: The wasteway receives water from the Yuma Main Canal at the check structure on the canal, 1,645 feet (501 m) upstream from the intake of the Colorado River siphon, and 3.2 miles (5.1 km) downstream from the Siphon Drop Power Plant. This wasteway discharges into the Colorado River on the California side, 1,000 feet (305 m) upstream from Colorado River below Yuma Main Canal Wasteway, and 6.5 miles (10.5 km) upstream from the northerly international land boundary.
RECORDS: Discharge is computed as the difference between the measured discharge of the Yuma Main Canal at the Siphon Drop Power Plant upstream and that of the same canal below the Colorado River siphon, with deductions for small irrigation diversions from the canal between the two gaging stations. Records obtained and furnished by U. S. Geological Survey. Records available: April 1913 through 1989.
REMARKS: The wasteway discharges to the river the flow in excess of irrigation water in the Yuma Main Canal.
EXTREMES: Prior to 1935, when storage began in Lake Mead: Average annual flow, 297,800 acre-feet (367,333,000 m3); maximum annual flow, 913,700 acre-feet (1,127,040,000 m3), 1932; minimum annual flow, 114,900 acre-feet (141,728,000 m3), 1917. Since 1935: Maximum mean daily discharge, 2,020 second-feet (57.2 m3/sec), December 24-25, 1948; minimum mean daily discharge, no flow on numerous occasions.

Mean Daily Discharge in Second-Feet 1989 —— Annual and Period Summary

Day	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	641	644	453	412	" 13	591	518	122	531	153	203	334
2	477	726	563	773	" 13	636	555	209	528	611	209	341
3	787	682	595	847	" 13	559	107	286	513	313	201	469
4	998	688	699	791	203	664	591	334	505	95	220	481
5	1,220	723	552	638	107	658	609	449	493	189	218	554
6	1,250	672	923	227	58	633	546	728	433	172	252	574
7	986	347	845	160	148	624	514	744	429	330	336	538
8	952	319	725	173	98	605	543	673	486	18	290	514
9	477	639	254	210	104	643	632	471	529	159	204	592
10	666	751	259	244	171	549	638	10	329	153	211	582
11	1,020	863	325	157	353	589	579	305	394	200	218	586
12	366	758	335	130	754	793	425	753	468	226	224	604
13	254	658	504	123	478	856	387	678	559	42	187	596
14	191	701	661	93	462	938	459	446	568	36	195	687
15	235	874	525	141	368	909	498	438	541	93	174	666
16	704	846	373	572	458	915	582	463	523	66	121	697
17	338	949	346	670	407	914	449	530	561	94	146	698
18	322	781	410	584	508	783	293	574	554	40	183	730
19	341	673	665	508	468	62	283	565	568	49	162	791
20	321	176	627	198	426	113	307	599	816	56	150	981
21	382	378	727	241	483	235	401	609	980	64	147	975
22	466	769	583	390	770	111	470	547	867	124	173	953
23	469	603	325	534	939	139	808	539	776	129	197	833
24	428	534	375	256	950	209	814	512	395	98	191	769
25	459	466	459	57	1,010	198	787	357	878	131	176	777
26	469	200	587	39	971	205	655	404	966	110	143	945
27	413	209	542	38	949	126	168	695	923	148	53	265
28	514	203	445	38	851	128	88	603	621	538	280	37
29	776		428	46	84	105	10	349	602	170	438	696
30	717		256	" 45	66	272	135	186	461	201	532	891
31	600		293		184		157	669		220		846
Sum	16,832		9,335		14,762		14,847		5,028		20,002	
	18,239		15,659		12,867		14,008		17,797		6,434	

Current Year 1989									Period 1935-1989		
Month	Extreme Gage Feet		ø Extreme Second-Feet				Average Second-Feet	Total Acre-Feet	Acre-Feet		
			High		Low				Average	Maximum	Minimum
	High	Low	Day		Day						
Jan.			6	1,250	14	191	588	36,177	45,451	110,700	446
Feb.			17	949	20	176	601	33,386	39,878	89,140	360
Mar.			6	923	9	254	505	31,059	39,346	90,190	357
Apr.			3	847	!27	38	311	18,516	39,582	86,580	326
May			25	1,010	! 1	" 13	415	25,521	47,158	88,280	333
June			14	938	19	62	492	29,280	41,333	86,960	342
July			24	814	29	10	452	27,784	38,820	91,220	369
Aug.			12	753	10	10	479	29,449	39,359	89,890	369
Sept.			21	980	10	329	593	35,300	43,123	83,660	357
Oct.			2	611	8	18	162	9,973	40,243	90,050	567
Nov.			30	532	27	53	214	12,762	40,020	101,500	715
Dec.			20	981	28	37	645	39,673	44,837	108,800	462
				1,250		10	454	328,880	499,150	1,042,850	6,669
Yearly	Meters		Cubic Meters per Second					Thousands of Cubic Meters			
				35.4		0.28	12.9	405,667	615,692	1,286,335	8,226

ø Mean daily ! And other days " Estimated

09-5211.00 COLORADO RIVER BELOW YUMA MAIN CANAL WASTEWAY AT YUMA, ARIZONA - DISCHARGES

DESCRIPTION: Water-stage recorder located in California on the right bank of the river, 1,000 feet (305 m) downstream from the mouth of the Yuma Main Canal Wasteway, 0.6 mile (1.0 km) downstream from the abandoned gaging station on the Colorado River at Yuma, 5.2 miles (8.4 km) downstream from the mouth of the Gila River, 19.6 miles (31.5 km) downstream from Imperial Dam, and 6.4 miles (10.3 km) upstream from the northerly international boundary. Zero of the gage is 101.99 feet (31.09 m) above mean sea level, U. S. C. & G. S. datum.

RECORDS: Based on current meter measurements and a continuous record of gage heights. Computations by shifting control methods. Records obtained and furnished by U. S. Geological Survey. Records available: October 1963 through 1989. Records from January 1951 through September 1963 deduced from "Colorado River at Yuma" plus flows from "Reservation Main Drain No. 4" and "Yuma Main Canal Wasteway."

REMARKS: Reservoirs on the Colorado River, power developments, transmountain diversions, reservoirs on the Gila River, irrigation diversions, and return flows modify the river flow at this station.

Mean Daily Discharge in Second-Feet 1989 —— Annual and Period Summary

Day	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	1,380	1,240	996	1,420	768	1,490	1,170	1,010	1,230	979	819	1,100
2	1,310	1,330	1,030	1,750	744	1,350	1,250	991	1,210	1,370	808	1,050
3	1,580	1,300	1,100	1,650	803	1,300	1,460	1,210	1,220	1,180	820	1,080
4	2,500	1,290	1,150	1,540	785	1,320	1,420	1,280	1,250	877	802	1,040
5	2,180	1,300	1,230	1,440	851	1,310	1,440	1,350	1,640	1,020	814	1,100
6	2,140	1,280	1,520	1,070	785	1,370	1,370	1,640	1,230	896	852	1,150
7	1,710	1,340	1,510	992	877	1,350	1,240	1,380	1,140	1,180	1,120	1,150
8	1,720	1,240	1,440	1,030	830	1,360	1,270	1,410	1,180	833	858	1,130
9	1,240	1,320	1,010	1,070	866	1,370	1,330	1,360	1,230	982	1,030	1,160
10	1,490	1,350	874	1,290	940	1,300	1,330	3,030	1,250	992	831	1,220
11	2,160	1,350	1,120	988	1,080	1,350	1,280	2,480	1,110	948	797	1,200
12	1,470	1,330	1,140	948	1,610	1,540	1,160	2,230	1,190	1,060	820	1,220
13	1,100	1,340	1,500	924	1,320	1,560	1,090	1,610	1,350	820	776	1,240
14	858	1,370	1,560	890	1,280	1,630	1,140	2,470	1,280	714	795	1,300
15	910	1,360	1,510	928	1,180	1,600	1,240	3,060	1,200	731	797	1,290
16	1,380	1,320	1,180	1,310	1,170	1,600	1,290	2,070	1,210	730	803	1,250
17	1,040	1,510	1,080	1,440	1,150	1,590	1,150	1,400	1,230	757	768	1,270
18	953	1,320	1,200	1,380	1,200	1,510	1,000	1,380	1,220	712	828	1,270
19	950	1,240	1,500	1,280	1,190	767	973	1,360	1,350	718	812	1,300
20	933	741	1,700	1,000	1,190	804	1,030	1,390	1,550	716	788	1,470
21	992	900	1,500	1,060	1,210	938	1,120	1,400	1,770	1,170	778	1,470
22	1,050	1,400	1,380	1,290	1,500	830	1,180	1,340	1,700	763	776	1,480
23	1,040	1,160	1,160	1,410	1,690	797	1,530	1,330	1,590	747	808	1,450
24	1,020	1,090	1,160	1,210	1,680	868	1,560	1,320	1,170	753	784	1,450
25	1,060	1,070	1,230	930	1,690	860	1,510	1,550	1,600	766	819	1,430
26	1,090	1,090	1,350	832	1,650	863	1,360	1,390	1,780	778	915	1,440
27	1,080	1,060	1,440	824	1,630	771	1,030	1,420	2,130	764	940	911
28	1,110	939	1,390	789	1,560	783	2,770	1,330	1,720	1,270	799	643
29	1,540		1,160	919	763	818	2,400	1,120	1,380	823	954	1,150
30	1,390		1,030	999	765	920	1,980	900	1,310	816	1,080	1,400
31	1,200		1,060		859		1,230	1,450		857		1,390
Sum	41,576	34,580	39,210	34,603	35,616	35,919	42,303	48,661	41,420	27,722	25,391	38,204

Month	Current Year 1989								Period 1951-1989		
	Extreme Gage Feet		Extreme Second-Feet				Average Second-Feet	Total Acre-Feet	Acre-Feet		
			High		Low						
	High	Low	Day		Day				Average	Maximum	Minimum
Jan.	11.37	8.51	11	2,940	14	768	1,340	82,465	248,237	1,068,099	29,857
Feb.	9.85	8.41	17	1,650	20	716	1,240	68,588	187,879	995,901	33,790
Mar.	10.52	8.53	15	2,200	10	777	1,260	77,772	190,692	1,073,270	34,604
Apr.	10.08	8.53	2	1,910	28	755	1,150	68,634	177,379	843,010	33,687
May	10.15	8.41	24	1,850	1	703	1,150	70,643	187,350	863,860	45,872
June	9.95	8.48	14	1,700	23	734	1,200	71,244	190,926	902,876	33,856
July	12.44	8.70	28	4,040	27	875	1,360	83,907	222,092	1,632,595	34,413
Aug.	12.38	8.59	10	3,980	30	773	1,570	96,518	226,885	1,681,388	33,610
Sept.	10.89	8.73	27	2,420	30	855	1,380	82,155	199,970	1,353,719	43,182
Oct.	10.03	8.38	3	1,750	15	690	894	54,986	171,442	1,451,107	34,965
Nov.	9.60	8.49	9	1,420	28	699	846	50,362	173,588	1,047,471	34,832
Dec.	9.75	8.21	22	1,540	28	611	1,230	75,776	203,344	1,114,550	33,023
Yearly	12.44	8.21		4,040		611	1,220	883,050	2,379,784	10,592,467	513,755
	Meters		Cubic Meters per Second						Thousands of Cubic Meters		
	3.79	2.50		114		17.3	34.6	1,089,225	2,935,416	13,065,596	633,707

1 And other days

09-5211.01 COLORADO RIVER BELOW YUMA MAIN CANAL WASTEWAY AT YUMA, ARIZONA - STAGES

(See Preceding Page for Description)

MEAN DAILY GAGE HEIGHT IN FEET 1989

Day	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	9.40	9.24	8.89	9.40	8.55	9.65	9.16	8.89	9.35	8.88	8.69	9.16
2	9.28	9.38	8.95	9.87	8.50	9.44	9.29	8.86	9.33	9.47	8.68	9.07
3	9.68	9.33	9.04	9.74	8.62	9.37	9.60	9.18	9.35	9.18	8.70	9.11
4	10.83	9.31	9.10	9.58	8.58	9.39	9.54	9.29	9.40	8.73	8.67	9.05
5	10.46	9.33	9.23	9.44	8.69	9.38	9.58	9.40	9.99	8.95	8.69	9.15
6	10.42	9.29	9.66	8.89	8.59	9.47	9.47	9.83	9.37	8.76	8.74	9.21
7	9.88	9.38	9.64	8.79	8.73	9.43	9.28	9.45	9.24	9.18	9.15	9.21
8	9.88	9.23	9.52	8.84	8.66	9.46	9.31	9.50	9.30	8.67	8.76	9.17
9	9.19	9.36	8.88	8.91	8.72	9.47	9.41	9.42	9.37	8.89	9.02	9.22
10	9.58	9.39	8.67	9.24	8.83	9.36	9.40	11.36	9.40	8.90	8.72	9.30
11	10.46	9.40	9.04	8.80	9.04	9.44	9.32	10.88	9.18	8.84	8.67	9.28
12	9.56	9.37	9.07	8.75	9.82	9.72	9.14	10.58	9.29	9.01	8.71	9.30
13	9.01	9.38	9.60	8.72	9.39	9.76	9.04	9.80	9.53	8.64	8.63	9.33
14	8.65	9.44	9.68	8.67	9.33	9.86	9.11	10.87	9.42	8.43	8.67	9.41
15	8.74	9.42	9.59	8.74	9.18	9.82	9.26	11.51	9.30	8.47	8.68	9.40
16	9.44	9.37	9.11	9.32	9.17	9.81	9.34	10.39	9.30	8.47	8.69	9.34
17	8.95	9.65	8.95	9.52	9.14	9.80	9.12	9.49	9.33	8.53	8.63	9.36
18	8.83	9.37	9.12	9.44	9.21	9.68	8.90	9.47	9.32	8.43	8.73	9.35
19	8.82	9.25	9.57	9.28	9.20	8.56	8.86	9.45	9.51	8.44	8.70	9.40
20	8.80	8.47	9.86	8.88	9.20	8.62	8.94	9.50	9.80	8.44	8.66	9.66
21	8.89	8.72	9.56	8.97	9.22	8.83	9.07	9.53	10.12	9.16	8.65	9.64
22	8.97	9.48	9.38	9.32	9.66	8.66	9.16	9.44	10.01	8.55	8.65	9.66
23	8.95	9.12	9.04	9.50	9.95	8.61	9.69	9.43	9.85	8.51	8.71	9.63
24	8.92	9.02	9.04	9.21	9.93	8.72	9.72	9.42	9.22	8.52	8.67	9.60
25	8.98	9.00	9.14	8.80	9.94	8.71	9.65	9.78	9.86	8.55	8.72	9.58
26	9.02	9.02	9.32	8.66	9.88	8.71	9.42	9.54	10.11	8.58	8.87	9.59
27	9.00	8.98	9.45	8.65	9.86	8.56	8.93	9.60	10.54	8.55	8.91	8.75
28	9.05	8.81	9.37	8.60	9.75	8.59	11.07	9.47	9.98	9.33	8.69	8.28
29	9.69		9.02	8.79	8.55	8.64	10.73	9.17	9.51	8.65	8.94	9.11
30	9.47		8.82	8.91	8.55	8.80	10.27	8.84	9.41	8.64	9.12	9.53
31	9.18		8.87		8.68		9.22	9.67		8.70		9.51
Avg.	9.35	9.23	9.23	9.07	9.13	9.21	9.42	9.71	9.56	8.74	8.75	9.30

09-5302.00 YUMA MESA OUTLET DRAIN TO COLORADO RIVER NEAR YUMA, ARIZONA

DESCRIPTION: Venturi meter with recorder 0.3 mile (0.5 km) from outlet to Colorado River, 0.5 mile (0.8 km) west of Joe Henry Memorial Park in Yuma, Arizona. Outlet is 1.7 miles (2.7 km) downstream from the mouth of Yuma Main Canal Wasteway.
RECORDS: Records are furnished by U. S. Geological Survey. Monthly discharge July 1970 through 1989. Prior to July 21, 1972, records furnished by U. S. Bureau of Reclamation.
REMARKS: Records show water pumped from wells on the Yuma Mesa and conveyed by underground conduit to Colorado River.

Mean Daily Discharge in Second-Feet 1989 —— Annual and Period Summary

Day	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	25	33	51	60	49	18	25	0	46	32	32	34
2	25	33	51	60	49	18	36	0	46	19	33	34
3	21	33	51	60	44	18	42	0	46	19	33	34
4	26	33	51	60	46	18	42	0	46	19	33	34
5	29	33	51	60	49	18	42	10	46	19	33	40
6	29	33	54	60	49	18	45	17	46	19	33	49
7	29	33	59	60	49	18	50	35	46	19	31	52
8	29	33	59	60	49	18	50	37	46	19	30	52
9	33	33	59	60	49	18	50	34	46	19	33	52
10	34	33	59	60	49	18	34	26	46	19	33	52
11	34	33	59	60	46	18	22	26	46	19	33	52
12	34	33	59	60	47	18	22	26	46	19	8.0	52
13	34	33	59	60	49	18	33	26	46	19	0	52
14	34	32	59	60	49	18	44	26	46	19	10	52
15	34	32	59	60	49	18	44	26	46	19	31	52
16	34	42	59	60	49	21	44	26	46	22	32	52
17	34	42	59	60	49	25	44	20	46	30	29	52
18	34	42	59	60	49	25	44	26	42	32	33	52
19	34	42	59	60	49	25	44	27	39	32	33	52
20	34	31	59	60	49	25	48	30	39	32	33	52
21	34	35	59	60	49	25	50	30	39	32	33	52
22	34	44	59	60	49	25	50	30	39	32	33	52
23	34	47	59	60	48	25	50	30	39	32	33	52
24	34	49	59	56	48	25	50	30	39	32	33	52
25	34	53	59	53	48	25	50	30	39	27	33	52
26	34	53	59	48	48	25	50	30	39	27	33	52
27	34	53	59	52	48	25	39	30	39	32	33	52
28	34	53	59	55	48	25	0	34	39	32	33	52
29	34		59	55	48	25	0	37	39	32	33	52
30	34		59	55	48	25	0	37	39	26	33	52
31	34		59		28		0	41		26		52
Sum	994	1,079	1,784	1,754	1,477	641	1,144	777	1,292	776	896.0	1,525

Current Year 1989									Period 1971-1989		
Month	Extreme Gage Feet		ø Extreme Second-Feet				Average Second-Feet	Total Acre-Feet	Acre-Feet		
	High	Low	High Day	High	Low Day	Low			Average	Maximum	Minimum
Jan.			!10	34	3	21	32	1,972	2,359	5,840	0
Feb.			!25	53	20	31	39	2,140	2,266	4,830	0
Mar.			! 7	59	! 1	51	58	3,539	2,623	5,430	4.0
Apr.			! 1	60	26	48	58	3,479	2,533	5,120	242
May			! 1	49	31	28	48	2,930	2,511	4,933	0
June			!17	25	!18	18	21	1,271	2,200	4,828	0
July			!21	50	!28	0	37	2,269	2,525	5,510	692
Aug.			31	41	! 1	0	25	1,541	2,664	6,000	180
Sept.			! 1	46	!19	39	43	2,563	2,702	5,880	0
Oct.			! 1	32	! 2	19	25	1,539	2,619	5,360	157
Nov.			! 2	33	13	0	30	1,777	2,654	5,290	313
Dec.			! 7	52	! 1	34	49	3,025	2,871	5,970	0
Yearly				60		0	39	28,045	30,527	58,680	1,753
	Meters		Cubic Meters per Second					Thousands of Cubic Meters			
				1.70		0	1.10	34,593	37,654	72,381	2,162

ø Mean daily ! And other days

09-5305.00 DRAIN NO. 8-B (ARAZ DRAIN)

DESCRIPTION: This drain discharges into the Colorado River 4.0 miles (6.4 km) downstream from Colorado River below Yuma Main Canal Wasteway, and 2.5 miles (4.0 km) upstream from the northerly international boundary. Prior to October 1955, published as "Araz Drain."
RECORDS: Records are furnished by the U. S. Geological Survey from current meter measurements during the year. Records available: May 1948 through 1989.
REMARKS: Drain 8-B, which was constructed in February 1948, collects seepage water in the westerly section of the Reservation Division of the Yuma Project which lies in California. Flow in the drain between the mouth and the U. S. Highway No. 80 culvert, about 3,200 feet (975 m) upstream, is affected by backwater from the river during ordinary high stages.
EXTREMES: Mean daily discharge: Maximum, 24 second-feet (0.68 m3/sec) on September 1, 1953; minimum, 0.1 second-foot (0.003 m3/sec) several days in February 1966.

Mean Daily Discharge in Second-Feet 1989 —— Annual and Period Summary

Day	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	5.8	15	5.8	5.4	5.7	6.3	5.7	5.3	7.9	11	8.7	10
2	5.5	14	6.0	5.4	5.7	6.2	5.7	5.3	7.6	11	9.2	10
3	5.8	13	5.9	5.4	5.7	6.2	5.8	6.4	7.2	12	9.4	10
4	5.8	13	5.9	5.5	5.6	6.1	5.8	6.4	6.9	11	9.5	10
5	5.8	12	5.8	5.5	5.6	6.0	5.9	6.4	6.5	11	9.7	10
6	5.8	12	5.7	5.5	5.6	6.0	5.9	6.4	6.5	11	9.9	10
7	5.8	11	5.7	5.5	5.5	5.9	5.9	6.4	6.6	10	10	10
8	6.2	11	5.6	5.6	5.5	5.9	6.0	6.4	6.6	10	10	10
9	6.5	10	5.6	5.6	5.5	5.8	6.0	6.4	6.7	9.7	10	9.8
10	6.9	9.5	5.5	5.6	5.5	5.8	6.0	6.4	6.7	9.4	11	9.4
11	7.3	8.9	5.4	5.6	5.5	5.7	6.1	6.4	6.7	9.1	11	8.9
12	7.6	8.3	5.4	5.7	5.5	5.7	6.1	6.4	6.8	9.3	11	8.5
13	8.0	7.8	5.3	5.7	5.5	5.6	6.2	6.4	6.8	9.5	11	8.0
14	8.4	7.2	5.2	5.7	5.5	5.6	6.2	6.4	7.0	9.7	11	7.8
15	8.7	6.6	5.2	5.7	5.6	5.5	6.2	6.4	7.2	10	11	7.6
16	9.1	6.1	5.1	5.7	5.6	5.5	6.3	6.4	7.4	10	11	7.3
17	9.5	6.0	5.1	5.8	5.6	5.4	6.3	6.4	7.5	10	11	7.1
18	9.8	6.0	5.1	5.8	5.6	5.4	6.3	6.4	7.7	11	11	6.9
19	10	5.9	5.1	5.8	5.6	5.4	6.2	6.4	7.9	10	11	6.7
20	11	5.9	5.2	5.8	5.6	5.3	6.2	6.4	8.1	10	11	6.4
21	11	5.8	5.2	5.8	5.7	5.3	6.1	6.4	8.3	10	11	6.2
22	11	5.8	5.2	5.8	5.7	5.3	6.0	6.4	8.5	10	11	6.0
23	12	5.7	5.2	5.9	5.7	5.4	6.0	6.4	8.7	9.9	11	5.8
24	12	5.7	5.2	5.9	6.3	5.4	5.9	6.5	8.9	9.8	11	5.5
25	12	5.6	5.2	5.9	6.3	5.5	5.8	6.7	9.0	9.7	10	5.3
26	13	5.6	5.3	5.9	6.3	5.5	5.7	6.9	9.2	9.5	10	5.1
27	13	5.5	5.3	5.9	6.3	5.5	5.7	7.1	9.4	9.4	10	5.0
28	14	5.5	5.3	5.8	6.3	5.6	5.6	7.3	9.6	9.2	10	5.0
29	14		5.3	5.8	6.3	5.6	5.5	7.5	9.9	9.1	10	4.9
30	14		5.3	5.8	6.3	5.7	5.5	7.7	10	9.0	10	4.9
31	15		5.3		6.3		5.4	7.9		8.8		4.8
Sum	290.3	234.4	167.4	170.8	179.0	170.1	184.0	202.6	233.8	309.1	311.4	232.9

Month	Extreme Gage Feet		ø Extreme Second-Feet				Average Second-Feet	Total Acre-Feet	Acre-Feet		
			High		Low						
	High	Low	Day		Day				Average	Maximum	Minimum
			Current Year 1989						**Period 1948-1989**		
Jan.			31	15	2	5.5	9.4	576	352	899	39.3
Feb.			1	15	!27	5.5	8.4	465	304	746	40.5
Mar.			2	6.0	!16	5.1	5.4	332	355	853	62.7
Apr.			!23	5.9	! 1	5.4	5.7	339	365	1,000	66.8
May			!24	6.3	! 7	5.5	5.8	355	377	966	58.3
June			1	6.3	!20	5.3	5.7	337	394	1,030	67.4
July			!16	6.3	31	5.4	5.9	365	452	1,260	72.8
Aug.			31	7.9	! 1	5.3	6.5	402	501	1,350	73.8
Sept.			30	10	! 5	6.5	7.8	464	492	1,370	53.6
Oct.			3	12	31	8.8	10	613	514	1,220	55.3
Nov.			!10	11	1	8.7	10	618	461	1,240	57.7
Dec.			! 1	10	31	4.8	7.5	462	407	1,050	42.2
Yearly				15		4.8	7.4	5,328	4,974	12,429	774
	Meters		Cubic Meters per Second					Thousands of Cubic Meters			
				0.42		0.14	0.21	6,572	6,135	15,331	955

ø Mean daily ! And other days

09-5270.00 PILOT KNOB POWER PLANT AND WASTEWAY NEAR PILOT KNOB, CALIFORNIA

DESCRIPTION: The Pilot Knob Power Plant and Wasteway is located on the All-American Canal, 20.8 miles (33.5 km) downstream from the intake at Imperial Dam, 6 miles (9.7 km) west of Yuma, about one mile (1.6 km) north of the northerly international boundary and empties into the old Alamo Canal in the United States and thence into the Colorado River through Rockwood gates, about one mile (1.6 km) upstream from the northerly international boundary. Water-stage recorder is located in forebay on right bank of the All-American Canal, 550 feet (168 m) upstream from wasteway gates and 1,800 feet (549 m) from entrance to the power plant. Datum of gage is 150.00 feet (45.72 m) above mean sea level. Tailrace gage is on left bank, 680 feet (207 m) downstream from power plant with automatic recording equipment in control house. All bypass gates are equipped with calibrated openings which are read on all gate changes. Datum of tailrace gage is at mean sea level; elevation of sill of wasteway gates is 147.88 feet (45.07 m), U. S. C. & G. S. datum. Prior to October 1956, this station was published as "Pilot Knob Wasteway near Pilot Knob, California."

RECORDS: Daily discharge is computed from flowmeter equipment and head and openings on wasteway gates or from head and gate opening on wicket and wasteway gates. Records furnished by the U. S. Geological Survey. Records available: July 1944 through 1989. The wasteway was operated for the purpose of diverting Colorado River water to the Alamo Canal for use in Mexico from July 1944 to November 8, 1950 in accordance with arrangements between the United States and Mexico for emergency use of the All-American Canal facilities. Records since 1950 show water released through Pilot Knob Power Plant and Wasteway from the All-American Canal and returned to the Colorado River through Rockwood gates.

REMARKS: Pilot Knob Wasteway was completed in 1938, and the first flow occurred on February 5, 1939. Pilot Knob Power Plant was completed in January 1957, and the first flow occurred on January 14, 1957.

EXTREMES: Maximum mean daily discharge, 9,930 second-feet (281 m3/sec) on October 6, 1985; minimum daily discharge, no flow during long periods.

Mean Daily Discharge in Second-Feet 1989 —— Annual and Period Summary

Day	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	604	0	1,270	1,640	2,010	0	1,090	1,910	0	0	0	0
2	1,020	0	1,320	1,540	2,420	0	1,340	1,920	0	0	0	0
3	62	0	1,180	1,760	2,320	0	1,010	1,680	0	0	0	0
4	1,320	0	1,090	1,950	2,410	0	1,030	1,580	0	0	0	0
5	2,800	0	995	1,980	2,310	0	1,040	1,580	0	0	0	0
6	1,610	0	996	2,390	2,400	0	1,190	1,230	0	0	0	0
7	989	0	996	2,490	2,260	0	1,320	1,460	0	0	0	0
8	0	0	1,060	2,410	2,030	0	1,250	1,380	0	0	0	0
9	0	0	1,610	2,340	1,780	0	1,200	1,700	0	0	0	0
10	0	0	1,610	2,100	1,240	0	1,180	2,620	0	0	0	0
11	379	0	1,460	2,440	1,030	0	1,290	2,360	0	0	0	0
12	753	0	1,480	2,530	0	0	1,360	1,070	0	0	0	0
13	0	0	1,160	2,650	0	0	1,480	1,040	0	0	0	0
14	0	0	1,920	2,630	0	0	1,370	1,040	0	0	0	0
15	0	0	1,760	2,680	0	0	1,240	1,010	0	0	0	0
16	0	576	1,230	2,340	0	0	1,230	1,040	0	0	0	0
17	0	279	1,550	2,140	0	0	1,530	1,440	0	0	0	0
18	0	0	1,440	2,160	0	0	1,680	1,430	0	0	0	0
19	0	0	1,090	2,240	0	1,230	1,710	1,470	0	0	0	0
20	0	1,040	1,010	2,570	0	1,130	1,630	1,430	0	0	0	0
21	0	1,410	1,150	2,520	0	1,110	1,550	1,400	0	0	0	0
22	0	1,060	1,290	2,320	0	1,090	1,500	1,450	0	0	0	0
23	0	1,040	1,630	2,140	0	1,160	1,120	1,310	0	0	0	0
24	0	1,040	1,630	2,110	0	1,130	1,100	1,250	0	0	0	0
25	0	1,080	1,540	2,190	0	1,130	1,110	1,040	0	0	0	0
26	0	994	1,440	1,940	0	1,030	1,330	1,110	0	0	0	0
27	0	1,070	1,410	1,910	0	1,030	1,920	1,050	0	0	0	537
28	0	1,230	1,330	1,860	16	1,080	3,010	1,090	0	0	0	1,010
29	0		1,610	1,810	1,060	1,060	1,860	1,010	0	0	0	440
30	0		1,720	1,710	1,090	1,090	1,790	1,000	0	0	0	0
31	0		1,730		1,070		1,420	0		0		0
Sum	9,537	10,819	42,707	65,490	25,446	13,270	43,880	42,100	0	0	0	1,987

Current Year 1989									Period 1944-1989		
Month	Extreme Gage Feet		Ø Extreme Second-Feet				Average Second-Feet	Total Acre-Feet	Acre-Feet		
			High		Low				Average	Maximum	Minimum
	High	Low	Day		Day						
Jan.			5	2,800	! 8	0	308	18,916	90,752	521,792	0
Feb.			21	1,410	! 1	0	386	21,459	65,025	469,507	0
Mar.			14	1,920	5	995	1,380	84,708	119,086	406,929	0
Apr.			15	2,680	2	1,540	2,180	129,897	131,868	362,400	0
May			2	2,420	!12	0	821	50,471	62,854	368,438	0
June			19	1,230	! 1	0	442	26,321	99,251	406,592	0
July			28	3,010	3	1,010	1,420	87,035	143,798	415,398	0
Aug.			10	2,620	31	0	1,360	83,504	146,906	404,370	0
Sept.				0		0	0	0	86,496	479,683	0
Oct.				0		0	0	0	62,032	500,429	0
Nov.				0		0	0	0	58,933	493,884	0
Dec.			28	1,010	! 1	0	64	3,941	93,501	568,225	0
Yearly				3,010		0	699	506,252	1,160,502	4,864,696	0
	Meters		Cubic Meters per Second					Thousands of Cubic Meters			
				85.2		0	19.8	624,452	1,431,456	6,000,505	0

Ø Mean daily ! And other days

09-5220.00 COLORADO RIVER AT NORTHERLY INTERNATIONAL BOUNDARY - DISCHARGES

DESCRIPTION: Water-stage recorder on the left (Arizona) bank and cableway at the point where the northerly international land boundary (California-Baja California) intersects the Colorado River, about 6.4 miles (10.3 km) downstream from Colorado River below Yuma Main Canal Wasteway, 5 miles (8.0 km) west of Yuma, Arizona, 1.1 miles (1.8 km) upstream from Morelos Diversion Structure, and about one mile (1.6 km) downstream from Rockwood Gate. Zero of the gage is at mean sea level, U. S. C. & G. S. datum. On May 1, 1988, the gage was relocated 170 feet upstream of the old gage on the left bank. Zero of the new gage is at mean sea level, U. S. C. & G. S. datum. Elevation of the new gage is equal to that of the old gage. Station is operated by the United States Section of the Commission.

RECORDS: Based on 208 current meter measurements during the year,118 by the United States Section, 88 by the Mexican Section of the Commission, 2 by the U. S. Geological Survey, and a continuous record of gage heights. Discharges are computed on the basis of a water-stage recorder 1,680 feet (512 m) upstream from the northerly international boundary where the remains of an old weir serve as a partial controlling section. A continuous gage height record is available November 15, 1948 through 1989; daily discharge records available January 1, 1950 through 1989.

REMARKS: Reservoirs on the Colorado River, including Lake Mead above Hoover Dam, where storage began in 1935, reservoirs on the Gila River, and many irrigation diversions and return flows regulate the river flow at this station except for infrequent flood flows. During 1989 the flow at this point represented the total amount of the Colorado River water which crossed the northerly international boundary.

EXTREMES: Prior to January 1935: Maximum instantaneous discharge estimated about 250,000 second-feet, (7,080 m3/sec), January 22, 1916; minimum discharge, no flow several days during August and September 1934; average annual flow 13,443,000 acre-feet (16,581,806,000 m3); maximum annual flow 25,480,000 acre-feet (31,429,325,000 m3), 1907; minimum annual flow 1,174,000 acre-feet (1,448,117,000 m3), 1934. Since January 1935: Maximum instantaneous discharge 40,600 second-feet (1,150 m3/sec) on August 20, 1983, minimum discharge, no flow during April 1935.

Mean Daily Discharge in Second-Feet 1989 —— Annual and Period Summary

Day	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	1,970	1,360	2,340 #	3,110 #	2,950 #	1,760 #	2,220 #	2,830 #	1,450	1,060	960	1,220 #
2	2,400	1,490	2,380 #	3,370	3,250 #	1,480 #	2,460	2,860 #	1,430 #	1,320 #	953 #	1,150
3	1,830 #	1,440	2,390	3,610 #	3,250 #	1,480 #	2,520 #	2,840	1,430	1,370	961	1,180
4	3,730 #	1,440 #	2,350	3,620	3,230	1,450	2,470 #	2,850	1,420	984 #	939 #	1,110 #
5	5,100 #	1,420	2,280	3,630	3,250	1,370 #	2,490	2,870 #	1,800 #	1,150 #	954	1,180 #
6	4,060 #	1,390	2,620 #	3,640 #	3,290 #	1,400 #	2,530 #	2,840	1,500 #	953 #	961 #	1,260
7	2,760	1,430	2,650 #	3,640	3,260	1,360	2,510	2,830 #	1,350 #	1,350 #	1,240	1,240 #
8	1,930	1,330	2,630	3,620 #	2,990 #	1,390 #	2,530	2,760 #	1,370	955	980 #	1,220
9	1,410 #	1,420	2,720 #	3,590	2,670 #	1,420	2,520	3,020	1,420 #	1,020	1,200	1,240 #
10	1,680	1,470	2,570	3,540 #	2,320 #	1,410 #	2,480 #	5,230 #	1,430	1,140 #	966	1,330
11	2,520	1,490 #	2,590 #	3,610 #	2,120 #	1,370	2,510 #	4,940 #	1,300 #	984 #	939 #	1,270
12	2,400	1,480	2,580	3,660 #	1,930 #	1,610 #	2,470 #	3,290 #	1,320 #	1,240 #	955	1,290
13	1,340	1,500 #	2,790 #	3,680 #	1,480 #	1,630 #	2,530 #	2,880	1,380	936	911 #	1,290 #
14	1,070 #	1,540 #	3,340	3,660 #	1,430	1,630	2,510 #	3,380 #	1,370 #	829 #	939 #	1,350 #
15	1,060	1,500	3,290 #	3,640 #	1,290 #	1,670 #	2,510	3,800 #	1,330	841	950	1,370
16	1,530	1,850 #	2,600 #	3,720	1,280 #	1,680	2,540	3,030	1,330	872 #	954 #	1,330 #
17	1,380 #	1,960	2,600 #	3,690 #	1,270	1,680 #	2,720 #	2,730 #	1,310	903 #	928	1,340
18	1,180	1,520 #	2,620 #	3,630 #	1,270 #	1,670	2,720 #	2,710 #	1,330 #	854	966 #	1,330 #
19	1,180 #	1,420	2,610	3,610	1,280	1,910 #	2,700 #	2,760	1,420 #	860	944	1,370 #
20	1,140	1,760	2,720	3,610 #	1,300 #	2,020 #	2,710 #	2,760	1,680	865 #	945 #	1,580
21	1,170 #	2,190 #	2,750 #	3,620	1,260	2,120 #	2,710 #	2,760 #	1,990 #	1,250 #	948 #	1,570 #
22	1,250	2,590 #	2,710 #	3,640 #	1,560 #	2,080 #	2,730 #	2,740	1,930	922	935 #	1,600
23	1,170 #	2,230 #	2,790	3,640	1,720 #	1,980 #	2,720	2,560	1,850 #	888 #	958	1,600 #
24	1,160 #	2,180	2,770	3,410 #	1,760 #	2,000 #	2,680 #	2,460 #	1,300	906 #	933	1,570
25	1,190	2,300 #	2,770 #	3,190 #	1,770	1,970	2,670	2,530	1,660 #	896	982 #	1,560
26	1,200	2,220	2,740	2,870 #	1,770	1,940 #	2,680 #	2,450 #	1,990 #	913 #	1,020	1,560 #
27	1,220 #	2,240 #	2,830 #	2,820 #	1,790 #	1,870 #	2,900	2,460	2,250 #	905	1,110	1,560 #
28	1,200	2,260 #	2,770 #	2,790 #	1,770	1,890	5,340 #	2,450 #	1,950	1,320 #	919	1,690 #
29	1,580		2,780	2,830 #	1,910	1,910 #	4,540 #	2,200 #	1,430	969	1,060	1,670
30	1,620 #		2,730 #	2,820	1,990 #	1,960	3,870	1,880	1,550 #	919	1,170 #	1,580
31	1,350 #		2,780		1,930 #		2,670 #	1,690 #		953 #		1,560
Sum	55,780	48,420	83,090	103,510	64,340	51,110	86,160	89,390	46,270	31,327	29,580	43,170

Current Year 1989								Period 1935-1989		
Month	Extreme Gage Feet		Extreme Second-Feet				Average Second-Feet	Total Acre-Feet	Acre-Feet		
			High		Low				Average	Maximum	Minimum
	High	Low	Day		Day						
Jan.	104.15	102.17	4	5,770	14	1,020	1,800	110,638	437,040	1,644,000	31,900
Feb.	104.29	102.38	22	2,880	19	1,130	1,730	96,040	359,378	1,382,678	60,400
Mar.	105.28	103.48	15	3,640	5	2,240	2,680	164,807	373,519	1,259,702	19,400
Apr.	105.20	104.00	16	3,950	30	2,650	3,450	205,309	310,822	1,072,264	0
May	104.86	102.38	5	3,410	17	1,170	2,080	127,616	307,172	1,151,000	71,405
June	103.57	102.61	1	2,220	11	1,310	1,700	101,375	310,181	1,321,388	8,500
July	105.28	103.46	29	5,990	1	2,120	2,780	170,896	331,033	1,867,835	24,400
Aug.	105.77	102.74	11	5,960	31	1,510	2,880	177,302	344,157	2,015,207	43,800
Sept.	103.69	102.27	27	2,490	30	969	1,540	91,775	300,188	1,853,355	53,851
Oct.	103.13	102.05	3	1,790	15	799	1,010	62,136	295,012	1,960,066	42,956
Nov.	102.69	102.11	9	1,480	28	869	986	58,671	326,799	1,532,231	41,403
Dec.	103.29	102.24	29	2,070	4	990	1,390	85,626	413,399	1,832,000	42,000
	105.77	102.05		5,990		799	2,010	1,452,191	4,108,700	15,430,412	722,100
Yearly	Meters		Cubic Meters per Second					Thousands of Cubic Meters			
	32.24	31.10		170		22.6	56.9	1,791,249	5,067,999	19,033,104	890,696

\# Discharge measurement made on this day ! And other days

09-5220.01 COLORADO RIVER AT NORTHERLY INTERNATIONAL BOUNDARY - STAGES

(See Preceding Page for Description)

MEAN DAILY GAGE HEIGHT IN FEET 1989

Day	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	103.15	102.48	103.60	104.32	104.41	103.14	103.66	104.23	102.70	102.30	102.21	102.48
2	103.68	102.65	103.66	104.54	104.76	102.74	103.93	104.28	102.68	102.56	102.20	102.41
3	102.98	102.61	103.71	104.75	104.76	102.78	104.01	104.26	102.66	102.67	102.21	102.44
4	103.50	102.59	103.64	104.75	104.73	102.72	103.95	104.28	102.64	102.23	102.19	102.36
5	103.58	102.56	103.53	104.78	104.76	102.64	103.96	104.29	103.11	102.40	102.20	102.45
6	103.49	102.52	103.96	104.79	104.79	102.75	104.00	104.28	102.75	102.19	102.18	102.54
7	103.40	102.59	103.98	104.78	104.76	102.70	103.98	104.26	102.58	102.66	102.49	102.52
8	103.06	102.49	103.96	104.77	104.55	102.69	104.01	104.19	102.59	102.20	102.22	102.53
9	102.47	102.56	104.04	104.73	104.27	102.69	103.99	104.23	102.65	102.27	102.45	102.52
10	102.78	102.62	103.89	104.68	103.70	102.75	103.95	104.62	102.67	102.41	102.21	102.62
11	103.24	102.71	103.90	104.73	103.43	102.70	103.98	104.66	102.54	102.21	102.18	102.54
12	103.16	102.73	103.88	104.78	103.16	102.97	103.92	104.59	102.56	102.53	102.20	102.54
13	102.43	102.73	104.14	104.89	102.75	103.00	103.98	104.29	102.58	102.18	102.14	102.54
14	102.22	102.77	105.00	104.88	102.67	102.94	103.96	104.74	102.58	102.08	102.17	102.59
15	102.21	102.70	104.90	104.97	102.49	103.05	103.90	104.71	102.55	102.08	102.18	102.62
16	102.64	103.00	103.95	105.03	102.47	103.02	103.93	104.43	102.54	102.11	102.20	102.59
17	102.54	103.13	103.90	105.01	102.52	103.03	104.11	104.18	102.53	102.14	102.17	102.58
18	102.30	102.79	103.93	104.94	102.48	103.04	104.20	104.16	102.56	102.11	102.21	102.57
19	102.30	102.60	103.92	104.94	102.47	103.29	104.18	104.21	102.62	102.10	102.18	102.59
20	102.27	102.97	104.02	104.93	102.53	103.29	104.18	104.21	103.90	102.09	102.19	102.78
21	102.29	*103.55	104.02	104.96	102.49	103.42	104.16	104.22	103.22	102.52	102.19	102.78
22	102.34	*104.00	103.97	104.97	102.79	103.42	104.17	104.22	103.17	102.17	102.17	102.80
23	102.33	103.57	104.03	104.97	102.96	103.30	104.16	104.06	103.10	102.14	102.20	102.82
24	102.32	103.53	104.03	104.78	103.02	103.40	104.13	103.95	102.56	102.15	102.18	102.81
25	102.33	103.59	104.03	104.58	103.06	103.36	104.13	104.04	102.86	102.14	102.25	102.81
26	102.35	103.51	104.01	104.24	103.09	103.31	104.13	103.95	103.21	102.15	102.28	102.79
27	102.36	103.50	104.07	104.20	103.15	103.16	*104.32	103.96	103.46	102.14	102.39	102.76
28	102.34	103.52	104.02	104.21	103.11	102.81	*104.53	103.92	103.18	102.58	102.16	102.94
29	102.75		104.02	104.23	103.27	103.22	*104.52	103.61	102.65	102.23	102.32	102.93
30	102.92		103.96	104.22	103.37	103.29	*104.77	103.20	102.83	102.17	102.42	102.80
31	102.46		104.01		103.30		104.03	103.01		102.21		102.79
Avg.	102.72	102.95	103.99	104.71	103.42	103.02	104.09	104.17	102.77	102.26	102.23	102.64

* Partly estimated

09-5318.50 COOPER WASTEWAY (VALLEY DIVISION, YUMA PROJECT)

DESCRIPTION: Water-stage recorder and control weir on wasteway for discharging regulatory waste water from the Cooper Canal to the Colorado River. This wasteway is located 0.5 mile (0.8 km) downstream from the northerly international boundary and 0.6 mile (1.0 km) upstream from Morelos Diversion Dam. Prior to July 14, 1971, the wasteway was located 0.4 mile (0.6 km) downstream from Morelos Diversion Dam. This wasteway discharges waste water from the Valley Division of the Yuma Project in the United States into the Colorado River. Since July 14, 1971, zero of the gage is 117.64 feet (35.86 m) above mean sea level, U. S. C. & G. S. datum.

RECORDS: Flow is computed from head on the weir measured by the water-stage recorder and weir rating determined by current meter measurements. Station operated by the United States Section of the Commission. Records available: Daily discharge March 1950 through 1989 obtained by the United States Section; monthly discharge, January 1934 through 1950 by the Bureau of Reclamation.

EXTREMES: Prior to March 1950, maximum monthly discharge 914 acre-feet (1,127,000 m3) in January 1940; minimum monthly discharge, zero for various months. Since March 1950, maximum instantaneous discharge, 79.3 second-feet (2.25 m3/sec) on June 19, 1965, at a maximum gage height of 114.13 feet (34.79 m) (old datum); minimum instantaneous discharge, zero during parts of most months.

Mean Daily Discharge in Second-Feet 1989 —— Annual and Period Summary

Day	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	4.9	2.1	3.6	9.2	15.1	4.6	2.4	5.4	10.3	1.5	1.2	9.2
2	3.2	2.4	9.7	1.4	.7	1.9	9.0	2.6	.2	6.1	2.7	4.3
3	.4	0	11.4	.2	0	4.2	.1	1.4	0	1.9	0	5.4
4	.1	.2	1.9	.1	0	0	5.9	7.7	0	.2	.1	.1
5	.1	.1	.2	0	0	0	3.1	.2	2.7	.4	1.6	0
6	7.3	.1	.1	0	0	0	.2	0	.3	7.0	.1	0
7	1.0	0	0	0	6.0	0	0	0	.3	2.9	0	2.5
8	0	.1	0	0	.3	0	0	.1	.4	8.1	0	29.3
9	0	1.1	5.3	0	1.2	0	0	20.5	.1	2.5	.1	28.4
10	0	.2	7.1	0	.4	0	0	27.4	0	6.1	8.7	4.0
11	0	10.1	16.2	0	5.7	.6	0	0	3.5	3.8	7.6	6.8
12	2.0	2.9	.5	0	1.3	1.3	0	0	2.5	1.2	5.7	6.3
13	7.8	.2	1.4	1.2	.4	.7	0	0	2.9	2.4	0	4.3
14	11.0	.2	5.8	.3	1.9	0	0	.7	0	3.9	1.3	1.9
15	6.9	.6	7.5	.1	1.5	0	4.2	0	1.0	4.0	4.0	2.6
16	1.5	.1	.4	0	.1	1.8	.1	5.3	1.1	7.7	0	5.9
17	.2	2.6	2.5	0	1.3	2.7	0	.2	1.4	3.5	9.8	11.1
18	1.2	4.2	.1	0	10.0	0	0	2.9	0	0	4.4	0
19	.1	5.1	9.9	0	4.2	0	0	3.4	0	0	1.5	0
20	6.2	.1	1.7	2.7	0	0	4.9	1.6	0	0	2.0	5.7
21	2.9	5.2	1.0	7.0	.1	0	3.8	.4	0	2.5	2.6	1.0
22	.1	.4	8.4	2.6	1.3	0	2.9	1.4	0	0	1.2	.4
23	0	0	1.6	.6	2.9	6.6	5.0	.8	.7	.8	7.6	5.3
24	0	.4	.1	.1	2.6	6.3	.5	.2	0	.1	4.2	.1
25	0	2.8	0	.6	1.8	5.1	0	.8	0	1.8	13.9	.1
26	0	2.0	0	3.1	0	1.1	0	.7	.3	0	7.4	0
27	.8	0	0	.2	2.7	.3	0	2.8	1.5	.1	6.2	7.1
28	4.8	7.1	1.7	0	0	1.5	0	0	0	7.5	18.3	9.3
29	2.3		3.8	0	0	4.3	0	0	0	3.5	7.2	.3
30	.1		1.6	0	0	0	0	0	1.8	2.6	4.0	3.4
31	.1		0		3.7		0	0		1.6		.1
Sum	65.0	50.3	103.5	29.4	65.2	43.0	42.1	86.5	31.0	83.7	123.4	154.9

Month	Extreme Gage Feet		Extreme Second-Feet				Average Second-Feet	Total Acre-Feet	Period 1935-1989 Acre-Feet		
			High		Low						
	High	Low	Day	High	Day	Low			Average	Maximum	Minimum
				Current Year 1989							
Jan.	2.85	0	14	68.9	! 3	0	2.1	129	154	914	0
Feb.	2.50	0	28	56.5	! 2	0	1.8	99.8	133	400	6.0
Mar.	2.37	0	29	52.2	! 1	0	3.3	205	145	517	0
Apr.	2.27	0	1	48.9	! 1	0	1.0	58.3	146	425	16.7
May	2.14	0	1	44.7	! 1	0	2.1	129	145	440	31.7
June	2.26	0	25	48.5	! 4	0	1.4	85.3	133	595	22.6
July	2.47	0	23	55.5	! 1	0	1.4	83.5	128	516	0
Aug.	2.71	0	19	63.9	! 1	0	2.8	172	99.9	617	0
Sept.	2.02	0	1	40.9	! 1	0	1.0	61.5	102	462	0
Oct.	2.20	0	8	46.6	! 1	0	2.7	166	129	490	0
Nov.	2.55	0	28	58.3	! 1	0	4.1	245	149	462	9.0
Dec.	2.62	0	8	60.7	! 1	0	5.0	307	169	592	13.7
Yearly	2.85	0		68.9		0	2.4	1,741	1,633	4,500	638
	Meters		Cubic Meters per Second					Thousands of Cubic Meters			
	0.87	0		1.95		0	0.07	2,147	2,014	5,551	787

1 And other days

09-5220.21 COLORADO RIVER IMMEDIATELY ABOVE MORELOS DAM - STAGES

DESCRIPTION: Water-stage recorder located on the right bank of the Colorado River in Mexico attached to the upstream abutment of the gates of the Intake Canal at Morelos Dam, 1.1 miles (1.8 km) downstream from the northerly international boundary, and about 7.5 miles (12.1 km) downstream from the Colorado River below Yuma Main Canal Wasteway. Since April 17, 1969, zero of the gage is at mean sea level, U. S. C. & G. S. datum; prior to that date, zero of the gage was 0.16 foot (0.05 m) below mean sea level.

RECORDS: Records obtained and furnished by the Mexican Section of the Commission. Records available: Staff gage height records November 8, 1950 to June 3, 1951; a continuous record of gage heights June 4, 1951 through 1989.

REMARKS: Prior to June 4, 1951, when a continuous water-stage recorder was installed, mean daily gage height records were determined from hourly readings of a staff gage.

EXTREMES: Since November 8, 1950: Maximum mean daily elevation above mean sea level, 114.44 feet (34.88 m) on August 18, 1983; minimum mean daily elevation above mean sea level, 101.51 feet (30.94 m) on February 17, 1957.

MEAN DAILY GAGE HEIGHT IN FEET 1989

Day	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	102.85	102.46	103.51	104.20	104.33	103.05	103.58	104.10	102.66	102.30	102.20	102.49
2	103.35	102.62	103.58	104.40	104.66	102.66	103.84	104.13	102.66	102.59	102.20	102.46
3	102.69	102.56	103.61	104.59	104.66	102.72	103.90	104.13	102.62	102.62	102.20	102.46
4	103.15	102.56	103.54	104.63	104.63	102.66	103.84	104.17	102.62	102.23	102.20	102.40
5	103.05	102.53	103.44	104.66	104.63	102.56	103.84	104.17	103.05	102.40	102.20	102.49
6	103.12	102.59	103.84	104.66	104.66	102.66	103.87	104.17	102.69	102.20	102.23	102.59
7	103.18	102.46	103.87	104.66	104.66	102.62	103.87	104.17	102.53	102.66	102.49	102.56
8	102.95	102.53	103.84	104.63	104.46	102.62	103.87	104.10	102.56	102.20	102.26	102.53
9	102.40	102.59	103.94	104.59	104.20	102.66	103.87	104.10	102.59	102.26	102.43	102.56
10	102.69	102.59	103.77	104.56	103.64	102.69	103.81	104.33	102.62	102.40	102.23	102.66
11	103.08	102.69	103.77	104.59	103.38	102.66	103.84	104.36	102.53	102.23	102.20	102.59
12	103.02	102.69	103.77	104.66	103.15	102.89	103.81	104.43	102.53	102.49	102.23	102.59
13	102.40	102.72	104.07	104.79	102.72	102.92	103.84	104.17	102.56	102.17	102.17	102.59
14	102.17	102.66	104.86	104.76	102.62	102.85	103.81	104.59	102.56	102.07	102.20	102.66
15	102.20	102.66	104.72	104.86	102.43	102.95	103.77	104.56	102.53	102.07	102.23	102.66
16	102.59	103.05	103.81	104.92	102.40	102.95	103.81	104.30	102.53	102.13	102.23	102.62
17	102.49	102.76	103.74	104.89	102.43	102.99	103.94	104.07	102.53	102.13	102.20	102.62
18	102.26	102.56	103.77	104.82	102.40	102.99	104.04	104.04	102.56	102.10	102.23	102.62
19	102.26	102.89	103.77	104.79	102.43	103.18	104.00	104.10	102.62	102.10	102.23	102.66
20	102.23	102.89	103.87	104.82	102.49	103.18	104.00	104.10	102.89	102.10	102.23	102.82
21	102.26	103.94	103.87	104.82	102.43	103.31	104.00	104.10	103.18	102.46	102.23	102.82
22	102.30	103.51	103.87	104.86	102.43	103.31	104.04	104.10	103.15	102.17	102.20	102.85
23	102.30	103.44	103.90	104.82	102.69	103.18	104.04	103.94	103.05	102.13	102.23	102.89
24	102.30	103.51	103.90	104.66	102.85	103.31	103.97	103.81	102.53	102.13	102.20	102.85
25	102.33	103.51	103.90	104.46	102.92	103.25	103.97	103.90	102.85	102.13	102.26	102.85
26	102.33	103.41	103.87	104.13	103.02	103.22	103.97	103.84	103.18	102.17	102.30	102.82
27	102.33	103.44	103.94	104.10	103.05	103.05	104.13	103.84	103.41	102.13	102.43	102.82
28	102.33	103.44	103.90	104.13	103.05	103.08	104.33	103.84	103.15	102.53	102.20	102.99
29	102.69		103.90	104.13	103.18	103.15	104.33	103.54	102.62	102.23	102.36	102.99
30	102.89		103.87	104.13	103.28	103.22	104.56	103.15	102.82	102.17	102.43	102.89
31	102.43		103.90		103.22		103.90	102.95		102.20		102.85
Avg.	102.60	102.90	103.87	104.59	103.33	102.95	103.95	104.04	102.75	102.25	102.25	102.69

09-5220.30 INTAKE CANAL AT MORELOS DIVERSION STRUCTURE - DISCHARGES

DESCRIPTION: Water-stage recorder and staff gage on left bank of Intake Canal, 200 feet (61.0 m) downstream from the intake at Morelos Dam, 1,350 feet (410 m) upstream from the point where it joins the old Alamo Canal, 2.2 miles (3.5 km) upstream from Matamoros Check, and about one mile (1.6 km) south of the northerly international boundary. The zero of the gage is 0.16 foot (0.05 m) below mean sea level, U. S. C. & G. S. datum.

RECORDS: The records are deduced from the flows arriving in the limitrophe section of the Colorado River at the northerly international boundary, the flows that pass downstream from the structure, and leakage through the structure. Records available: November 8, 1950 through 1989. Records obtained and furnished by the Mexican Section of the Commission.

REMARKS: The canal is operated with a minimum hydraulic slope to permit the maximum retention of silt above Matamoros Check, and the lower velocities in the canal do not permit measuring the flow with a current meter. Records for this station show the amounts of Colorado River water diverted at Morelos Diversion Dam to the Intake Canal and thence to the Alamo Canal for use in Mexico. Under conditions set forth in the 1944 Water Treaty, water for use in Mexico may be diverted to the Alamo Canal in the United States directly from the river at Rockwood Heading or by means of Imperial Dam, the All-American Canal, and certain facilities of the Imperial Irrigation District. No diversions of this nature have been made during the years 1951 through 1989, and consequently the records reported below show the total water diverted from the Colorado River to the Alamo Canal during those years. Mexico occasionally pumps water from the Colorado River at other points below Morelos Dam when water is available in the channel.

EXTREMES: Maximum mean daily discharge, 6,600 second-feet (187 m3/sec), July 12 and 14, 1983; maximum mean daily gage height, 107.32 (32.71 m) March 30 and 31, 1985, and March 1, 1986. Minimum daily discharge, no flow on various occasions.

Mean Daily Discharge in Second-Feet 1989 —— Annual and Period Summary

Day	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	1,970	1,360	2,340	3,120	2,970	1,770	2,220	2,840	1,460	1,060	961	1,230
2	2,400	1,490	2,390	3,370	3,250	1,480	2,470	2,860	1,430	1,330	957	1,150
3	1,750	1,440	2,400	3,600	3,250	1,480	2,520	2,840	1,430	1,370	961	1,190
4	1,760	1,440	2,350	3,640	3,230	1,450	2,480	2,860	1,420	985	939	1,110
5	1,810	1,420	2,280	3,640	3,250	1,370	2,490	2,870	1,800	1,150	957	1,180
6	2,240	1,390	2,620	3,640	3,290	1,400	2,530	2,840	1,500	961	961	1,260
7	2,320	1,430	2,650	3,640	3,270	1,360	2,510	2,830	1,350	1,350	1,240	1,240
8	1,900	1,330	2,630	3,640	2,990	1,390	2,530	2,760	1,370	964	982	1,250
9	1,410	1,420	2,730	3,600	2,670	1,420	2,520	2,940	1,420	1,020	1,200	1,270
10	1,680	1,470	2,580	3,530	2,320	1,410	2,480	3,570	1,430	1,150	975	1,330
11	1,990	1,500	2,610	3,600	2,130	1,370	2,510	3,480	1,300	989	946	1,280
12	1,890	1,480	2,580	3,670	1,930	1,610	2,470	3,190	1,320	1,240	961	1,300
13	1,350	1,500	2,790	3,670	1,480	1,630	2,530	2,880	1,380	939	911	1,290
14	1,080	1,540	3,350	3,670	1,430	1,630	2,510	3,380	1,370	833	939	1,350
15	1,070	1,500	3,300	3,640	1,290	1,670	2,510	3,810	1,330	844	953	1,370
16	1,530	1,840	2,600	3,710	1,280	1,680	2,540	3,040	1,330	879	953	1,330
17	1,380	1,900	2,600	3,670	1,270	1,680	2,720	2,730	1,310	908	939	1,350
18	1,180	1,530	2,620	3,640	1,280	1,670	2,720	2,710	1,330	855	971	1,330
19	1,180	1,430	2,620	3,600	1,290	1,910	2,700	2,760	1,420	862	946	1,370
20	1,150	1,760	2,720	3,600	1,300	2,020	2,720	2,760	1,680	865	946	1,590
21	1,170	2,200	2,750	3,640	1,260	2,120	2,720	2,760	1,990	1,250	950	1,570
22	1,250	2,590	2,720	3,640	1,560	2,080	2,730	2,740	1,930	922	936	1,600
23	1,170	2,230	2,790	3,640	1,720	1,990	2,730	2,560	1,850	890	968	1,610
24	1,160	2,180	2,770	3,410	1,760	2,010	2,680	2,470	1,300	908	936	1,570
25	1,190	2,300	2,770	3,190	1,770	1,970	2,670	2,530	1,660	897	996	1,560
26	1,200	2,220	2,740	2,870	1,770	1,940	2,680	2,450	1,990	915	1,030	1,560
27	1,220	2,240	2,830	2,820	1,790	1,870	2,770	2,470	2,250	904	1,120	1,570
28	1,200	2,270	2,760	2,790	1,770	1,890	3,150	2,450	1,950	1,330	936	1,700
29	1,580		2,780	2,830	1,910	1,910	3,100	2,200	1,430	971	1,070	1,670
30	1,620		2,730	2,820	1,990	1,960	3,260	1,880	1,550	932	1,170	1,580
31	1,350		2,780		1,940		2,630	1,690		953		1,560
Sum	47,150	48,400	83,180	103,540	64,410	51,140	81,800	86,150	46,280	31,426	29,710	43,320

Month	Extreme Gage Feet		Ø Extreme Second-Feet				Average Second-Feet	Total Acre-Feet	Acre-Feet		
			High		Low						
	High	Low	Day		Day				Average	Maximum	Minimum
Jan.	103.58	101.12	2	2,400	20	1,150	1,520	93,518	88,525	223,193	966
Feb.	103.87	101.67	22	2,590	8	1,330	1,730	96,004	86,752	203,958	9,232
Mar.	104.72	103.02	14	3,350	5	2,280	2,680	165,005	188,380	352,959	97,902
Apr.	104.76	103.51	16	3,710	28	2,790	3,450	205,380	212,863	328,093	153,792
May	104.40	101.67	6	3,290	21	1,260	2,080	127,763	112,937	232,004	66,207
June	103.12	102.07	21	2,120	7	1,360	1,710	101,468	161,539	269,632	95,177
July	104.72	102.89	30	3,260	1	2,220	2,640	162,218	225,287	356,040	125,745
Aug.	105.05	102.17	15	3,810	31	1,690	2,780	170,890	223,303	341,044	130,298
Sept.	103.12	101.57	27	2,250	!11	1,300	1,540	91,850	133,328	273,177	53,633
Oct.	102.56	100.75	3	1,370	14	833	1,010	62,348	71,555	227,661	10,453
Nov.	102.00	100.85	7	1,240	13	911	989	58,915	60,746	209,478	7,516
Dec.	102.72	101.44	28	1,700	4	1,110	1,400	85,952	90,844	200,974	8,825
	105.05	100.75		3,810		833	1,960	1,421,311	1,658,900	2,798,192	1,272,332
Yearly	Meters		Cubic Meters per Second					Thousands of Cubic Meters			
	32.02	30.71		108		23.6	55.5	1,753,168	2,046,231	3,451,533	1,569,404

Current Year 1989 — Period 1950-1989

Ø Mean daily ! And other days

09-5220.31 INTAKE CANAL AT MORELOS DIVERSION STRUCTURE - STAGES

(See Preceding Page for Description)

MEAN DAILY GAGE HEIGHT IN FEET 1989

Day	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	102.72	101.74	103.15	103.81	103.97	102.76	103.18	103.64	102.13	101.28	101.02	101.80
2	103.25	102.13	103.22	104.04	104.33	102.26	103.44	103.74	102.07	101.71	101.02	101.71
3	102.53	102.10	103.25	104.27	104.33	102.36	103.58	103.71	102.03	101.90	101.05	101.77
4	102.59	102.03	103.18	104.30	104.30	102.26	103.51	103.74	102.00	101.08	101.02	101.61
5	102.46	102.00	103.08	104.33	104.30	102.13	103.48	103.77	102.53	101.48	101.05	101.77
6	102.76	101.97	103.51	104.33	104.33	102.23	103.51	103.74	101.77	101.02	101.05	101.97
7	102.79	102.00	103.54	104.33	104.33	102.20	103.48	103.74	101.80	101.80	101.57	101.84
8	102.53	101.84	103.51	104.33	104.13	102.17	103.51	103.64	101.94	101.08	101.05	101.84
9	101.80	101.90	103.58	104.30	103.84	102.17	103.48	103.67	101.97	101.18	101.57	101.90
10	102.23	102.07	103.41	104.23	103.35	102.33	103.44	103.87	101.97	101.61	101.31	102.07
11	102.69	102.26	103.41	104.27	102.99	102.26	103.48	103.90	101.80	101.08	101.18	101.90
12	102.59	102.30	103.38	104.33	102.76	102.53	103.41	103.94	101.87	101.84	101.12	101.84
13	101.71	102.30	103.67	104.43	102.30	102.53	103.48	103.67	101.84	101.12	100.95	101.80
14	101.35	102.30	104.53	104.43	102.17	102.40	103.44	104.10	101.77	100.85	100.98	101.94
15	101.28	102.20	104.43	104.49	101.84	102.56	103.38	104.00	101.74	100.89	100.98	102.00
16	101.90	102.49	103.51	104.59	101.80	102.56	103.41	103.77	101.64	101.08	101.05	101.97
17	102.03	102.76	103.41	104.56	101.94	102.59	103.61	103.58	101.61	101.08	100.98	101.94
18	101.41	102.36	103.44	104.49	101.80	102.59	103.71	103.61	101.64	101.02	101.12	101.87
19	101.35	102.03	103.44	104.46	101.94	102.85	103.67	103.64	101.77	100.89	101.15	101.94
20	101.38	102.40	103.54	104.49	102.03	102.82	103.67	103.67	102.30	100.95	101.35	102.10
21	101.28	103.08	103.54	104.53	102.00	102.95	103.67	103.64	102.66	101.67	101.41	102.13
22	101.41	103.61	103.51	104.53	102.26	102.95	103.71	103.64	102.59	101.08	101.28	102.20
23	101.41	103.15	103.58	104.49	102.43	102.85	103.67	103.51	102.49	100.89	101.35	102.26
24	101.41	103.12	103.58	104.33	102.49	102.95	103.67	103.38	101.71	100.92	101.31	102.26
25	101.31	103.18	103.58	104.13	102.53	102.92	103.64	103.48	102.17	100.79	101.41	102.26
26	101.31	103.08	103.54	103.74	102.62	102.82	103.64	103.38	102.62	100.82	101.51	102.23
27	101.38	103.05	103.58	103.71	102.72	102.62	103.81	103.41	102.89	100.79	101.80	102.13
28	101.35	103.08	103.54	103.74	102.69	102.62	104.00	103.38	102.59	101.57	101.18	102.43
29	102.13		103.54	103.74	102.82	102.69	103.97	103.05	101.84	101.21	101.25	102.46
30	102.46		103.51	103.74	102.95	102.79	104.20	102.69	102.20	101.05	101.64	102.30
31	101.84		103.54		102.92		103.51	102.46		101.05		102.26
Avg.	101.96	102.45	103.52	104.25	102.94	102.56	103.59	103.59	102.07	101.19	101.22	102.02

09-5220.41 COLORADO RIVER IMMEDIATELY BELOW MORELOS DAM - STAGES

DESCRIPTION: Water-stage recorder located on the right bank of the Colorado River in Mexico immediately downstream from Morelos Dam, 1.1 miles (1.8 km) downstream from the northerly international boundary, and about 7.5 miles (12.1 km) downstream from the Colorado River below Yuma Main Canal Wasteway. Since April 17, 1969, zero of the gage is at mean sea level, U. S. C. & G. S. datum; prior to that date, zero of the gage was 0.16 foot (0.05 m) below mean sea level.
RECORDS: Records obtained and furnished by the Mexican Section of the Commission. Records available: Staff gage heights, February 20, 1951 to June 6, 1966; continuous record of gage heights June 7, 1966 through 1989.
REMARKS: On June 7, 1966 a continuous water-stage recorder was installed; prior to this date, mean daily gage heights were determined from hourly readings of staff gage.
EXTREMES: Maximum mean daily gage height, 113.98 feet (34.74 m) on August 18, 1983; minimum mean gage height, 97.24 feet (29.64 m) on several days during October 1988.

MEAN DAILY GAGE HEIGHT IN FEET 1989

Day	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	97.93	97.54	97.41	97.41	97.38	97.38	97.41	97.74	97.54	97.54	97.54	97.54
2	97.87	97.54	97.41	97.38	97.38	97.38	97.44	97.74	97.54	97.60	97.54	97.54
3	97.83	97.54	97.41	97.38	97.38	97.38	97.44	97.70	97.54	97.54	97.54	97.54
4	101.21	97.54	97.41	97.38	97.38	97.38	97.47	97.70	97.54	97.54	97.54	97.54
5	102.89	97.54	97.41	97.38	97.38	97.38	97.47	97.70	97.54	97.54	97.54	97.54
6	101.57	97.54	97.41	97.38	97.38	97.38	97.51	97.70	97.54	97.54	97.54	97.54
7	99.93	97.54	97.41	97.38	97.38	97.38	97.51	97.70	97.54	97.54	97.54	97.54
8	97.77	97.54	97.41	97.38	97.38	97.38	97.51	98.98	97.54	97.54	97.54	97.54
9	97.57	97.54	98.41	97.38	97.38	97.38	97.54	103.31	97.54	97.54	97.54	97.54
10	97.54	97.54	98.41	97.38	97.38	97.38	97.54	103.31	97.54	97.54	97.54	97.54
11	98.98	97.54	97.41	97.38	97.38	97.38	97.51	102.82	97.54	97.54	97.54	97.54
12	99.21	97.54	97.41	97.38	97.38	97.38	97.60	98.72	97.54	97.54	97.54	97.54
13	97.57	97.54	97.41	97.38	97.38	97.38	97.51	97.57	97.54	97.54	97.54	97.54
14	97.54	97.54	97.41	97.38	97.38	97.44	97.51	97.54	97.54	97.54	97.54	97.57
15	97.54	97.54	97.41	97.38	97.38	97.38	97.51	99.80	97.54	97.54	97.54	97.60
16	97.54	98.20	97.41	97.38	97.38	97.38	97.51	97.67	97.54	97.54	97.54	97.60
17	97.54	98.56	97.41	97.38	97.38	97.38	97.54	97.54	97.54	97.54	97.54	97.57
18	97.54	97.47	97.41	97.38	97.38	97.38	97.57	97.54	97.54	97.54	97.54	97.57
19	97.54	97.41	97.41	97.38	97.38	97.38	97.67	97.54	97.54	97.54	97.54	97.60
20	97.54	97.41	97.41	97.38	97.38	97.41	97.57	97.54	97.54	97.54	97.54	97.60
21	97.54	97.41	97.41	97.38	97.38	97.44	97.54	97.54	97.54	97.57	97.54	97.60
22	97.54	97.41	97.41	97.38	97.38	97.41	97.54	97.54	97.54	97.57	97.54	97.60
23	97.54	97.41	97.41	97.38	97.38	97.41	97.54	97.54	97.54	97.57	97.54	97.60
24	97.54	97.41	97.41	97.38	97.38	97.41	97.54	97.54	97.54	97.57	97.54	99.60
25	97.54	97.41	97.41	97.38	97.38	97.41	97.57	97.54	97.54	97.57	97.54	97.60
26	97.54	97.41	97.41	97.38	97.38	97.38	97.57	97.54	97.54	97.54	97.54	97.67
27	97.54	97.41	97.41	97.38	97.38	97.38	97.74	97.54	97.54	97.57	97.54	97.64
28	97.54	97.41	97.41	97.38	97.38	97.38	103.41	97.54	97.54	97.57	97.54	97.64
29	97.54		97.41	97.38	97.38	97.41	102.33	97.54	97.54	97.57	97.54	97.64
30	97.54		97.41	97.38	97.38	97.44	100.13	97.54	97.54	97.54	97.54	97.60
31	97.54		97.41		99.38		98.62	97.54		97.54		97.60
Avg.	98.18	97.55	97.41	97.38	97.38	97.39	98.00	98.28	97.54	97.55	97.54	97.58

09-5319.00 WELLTON-MOHAWK DRAINAGE WATER DISCHARGED TO COLORADO RIVER BELOW MORELOS DAM

DESCRIPTION: Water-stage recorder located on downstream end of the Wellton-Mohawk Drainage Extension Channel on the Arizona bank of the Colorado River at the east end of the weir section of Morelos Dam, 1.1 miles (1.8 km) downstream from the northerly international boundary. The elevation of the zero of the gage has not been determined.

RECORDS: Based on discharge measurements and a continuous record of gage heights. Station is operated by the United States Section of the Commission. Records available: November 16, 1965 through 1989.

REMARKS: Pursuant to Minute 218 of the Commission, an extension to the Wellton-Mohawk Drainage Conveyance Channel was constructed along the left bank of the Colorado River to a point immediately below Morelos Dam, a distance of about 12 miles (19.3 km), and placed in operation on November 16, 1965. Drainage flows may be discharged on an emergency basis to the Gila River and thence to the Colorado River at the diversion structure, Main Outlet Drain Extension No. 1, at the upstream end of the extension; directly to the Colorado River at Main Outlet Drain Extension No. 2, 1.9 miles (3.1 km) upstream from Morelos Dam; and directly to the Colorado River immediately below Morelos Dam at this station, Main Outlet Drain Extension No. 3. On July 14, 1972, Minute No. 241 of the Commission became effective. The Minute called for discharge of all Wellton-Mohawk drainage waters to be made below Morelos Dam. On August 30, 1973, Minute No. 242 of the Commission became effective. The Minute called for construction of a concrete-lined bypass drain from Morelos Dam to the Santa Clara Slough in Mexico. On June 23, 1977, the first flow was recorded in the bypass drain. Drainage flows through Main Outlet Extension No. 3 will be only on an emergency basis.

Mean Daily Discharge in Second-Feet 1989 —— Annual and Period Summary

Day	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	0	0	0	0	0	0	0	0	0	8.6	0	0
2	0	0	0	0	0	0	0	0	0	8.5	0	0
3	0	0	0	0	0	0	0	0	0	0	0	0
4	0	0	0	0	0	0	0	0	0	0	0	0
5	0	0	0	0	0	0	0	0	8.6	0	0	0
6	0	0	0	0	0	0	0	0	0	0	0	0
7	0	0	0	0	0	0	0	0	0	0	0	0
8	0	0	0	0	0	0	0	0	0	0	0	0
9	0	0	0	0	0	0	0	.6	0	0	0	0
10	0	0	0	0	0	0	1.2	0	0	0	0	0
11	0	0	0	0	0	0	0	0	0	0	0	0
12	0	0	0	0	0	0	4.2	0	0	0	0	0
13	0	0	0	0	0	0	0	0	0	0	0	0
14	0	0	0	0	0	0	0	0	0	0	0	0
15	0	0	0	0	0	0	0	0	0	0	0	0
16	0	0	0	0	0	0	0	0	0	0	0	0
17	0	0	0	0	0	0	0	0	0	0	0	0
18	0	0	0	0	0	0	0	0	0	0	0	0
19	0	0	0	0	0	0	3.3	0	0	0	0	0
20	0	0	0	0	0	0	0	0	0	0	0	0
21	0	0	0	0	0	0	0	0	0	0	0	0
22	0	0	0	* 0	0	0	0	0	0	0	0	0
23	0	0	0	" 0	0	0	0	0	0	0	0	0
24	0	0	0	" 0	0	0	0	0	0	0	0	0
25	0	0	0	" 0	0	0	0	0	0	0	0	.6
26	0	0	0	" 0	0	0	0	0	0	0	0	1.6
27	0	0	0	" 0	0	0	0	0	0	0	0	.9
28	0	0	0	" 0	0	0	0	0	0	0	0	.3
29	0		0	" 0	0	0	0	0	0	0	0	.1
30	0		0	" 0	0	0	0	0	0	0	0	0
31	0		0		0		0	0		0		0
Sum	0	0	0	0	0	0	8.7	0.6	8.6	17.1	0	3.5

Current Year 1989									Period 1966-1989		
Month	Extreme Gage Feet		Extreme Second-Feet				Average Second-Feet	Total Acre-Feet	Acre-Feet		
	High	Low	High Day	High	Low Day	Low			Average	Maximum	Minimum
Jan.	0	0		0		0	0	0	8,088	18,718	0
Feb.	0	0		0		0	0	0	6,295	16,992	0
Mar.	0	0		0		0	0	0	4,441	18,506	0
Apr.	0	0		0		0	0	0	3,977	18,601	0
May	0	0		0		0	0	0	5,995	19,091	0
June	.02	0	29	.1	! 1	0	0	0	4,717	18,756	0
July	2.27	0	12	179	! 1	0	.3	17.3	4,335	18,946	0
Aug.	.39	0	9	11.8	! 1	0	0	1.2	4,407	19,188	0
Sept.	2.73	0	5	239	! 1	0	.3	17.1	6,193	18,474	0
Oct.	.62	0	! 1	24.2	! 1	0	.6	33.9	8,717	19,200	0
Nov.	0	0		0		0	0	0	8,263	18,478	0
Dec.	.11	0	!25	1.7	! 1	0	.1	6.9	7,504	19,121	0
Yearly	2.73	0		239		0	0.1	76.4	72,932	214,781	0
	Meters		Cubic Meters per Second					Thousands of Cubic Meters			
	0.83	0		6.77		0	0	94.2	89,960	264,928	0

! And other days " Estimated * Partly estimated

09-5325.00 ELEVEN MILE WASTEWAY (VALLEY DIVISION, YUMA PROJECT)

DESCRIPTION: Water-stage recorder and control weir on wasteway for discharging water from the West Main Canal to the Colorado River. This wasteway is located in Arizona, 4.3 miles (6.9 km) downstream from the northerly international boundary and 3.2 miles (5.1 km) downstream from Morelos Diversion Dam. It is the largest of three wasteways discharging waste water from the Valley Division of the Yuma Project in the United States into the limitrophe section of the Colorado River. Since June 1986, zero of the gage is 111.72 feet above mean sea level, U. S. C. & G. S. datum; prior to that date, zero of the gage was mean sea level, U. S. C. & G. S. datum.

RECORDS: Flow is computed from head on the weir measured by the water-stage recorder and weir rating determined by current meter measurements. Station operated by the United States Section of the Commission. Records available: Daily discharge, January 1951 through 1989, obtained by the United States Section; monthly discharge, January 1924 through 1950 by Bureau of Reclamation.

EXTREMES: Prior to January 1951, maximum monthly discharge, 9,740 acre-feet (12,014,000 m3) in August 1940; minimum monthly discharge, zero in April 1941. Since January 1, 1951, maximum instantaneous discharge, 800 second-feet (22.7 m3/sec) on December 3, 1961, at a maximum gage height of 117.60 feet (35.84 m); minimum instantaneous discharge, zero during parts of most years.

Mean Daily Discharge in Second-Feet 1989 —— Annual and Period Summary

Day	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	21.2	4.5	3.4	1.6	43.5	0.1	0	0	0.8	0	4.0	2.8
2	2.4	.1	4.2	62.0	5.4	.4	.3	0	2.8	1.7	4.8	2.5
3	.3	9.3	5.1	19.8	1.0	1.6	1.6	* 1.0	1.2	10.4	12.9	58.3
4	3.5	7.1	6.2	4.1	.3	0	.6	* .2	0	4.3	1.0	18.7
5	4.4	10.9	92.8	3.2	1.1	.7	3.3	" 0	0	1.6	28.5	# 5.9
6	.3	5.7	12.4	.1	0	1.5	.1	" 0	.5	2.8	19.4	6.0
7	4.1	.1	2.0	0	0	1.2	.1	* .1	0	.7	4.8	1.9
8	5.8	8.0	1.3	0	0	.1	.2	.3	.3	3.6	3.5	2.0
9	2.8	6.9	.7	.1	.2	.1	0	47.7	0	3.7	.5	0
10	13.8	0	# .2	.5	1.5	.8	0	48.3	.9	1.3	0	1.6
11	11.5	11.6	.5	0	.1	0	0	.6	1.3	1.3	.1	2.3
12	2.0	12.7	1.9	.8	.4	0	1.8	31.4	2.5	.1	8.5	1.1
13	1.2	# 13.6	4.3	2.5	.3	0	5.2	0	4.9	.5	1.1	.5
14	.4	7.0	0	2.5	0	.6	1.4	6.0	1.6	1.2	1.7	.3
15	3.4	6.9	.9	0	0	1.5	0	.1	1.0	1.2	.9	0
16	2.2	8.8	2.3	.2	1.3	.1	.1	0	0	6.2	1.3	0
17	8.4	15.1	0	2.4	2.0	.4	2.8	2.7	5.8	4.3	10.8	0
18	4.2	.6	.5	1.9	0	.1	" 0	0	2.7	6.7	2.2	4.9
19	2.6	15.7	0	3.8	0	3.0	" .4	.5	2.0	3.2	.2	17.5
20	1.8	8.1	.2	7.3	0	.6	" .5	1.5	.1	14.9	0	2.5
21	9.6	.3	.8	3.3	0	.5	" .1	0	6.3	2.3	.1	.1
22	17.4	.5	.5	4.9	0	1.2	" .1	1.5	.3	1.0	3.7	0
23	38.4	0	# 1.7	1.3	.4	.1	" 36.9	14.7	.8	2.6	.2	15.6
24	6.2	.1	1.4	1.1	.1	0	* 29.2	2.5	.7	21.8	4.6	11.7
25	3.8	.5	.1	1.2	.6	0	* 8.7	.9	1.0	5.8	3.0	.5
26	.4	1.8	4.3	.8	.1	0	* 6.4	0	2.3	1.3	23.4	.7
27	6.9	16.0	.5	.1	0	0	28.1	0	.4	0	23.1	4.8
28	0	1.2	0	0	0	0	71.5	0	0	.4	5.1	.1
29	0		.1	0	0	0	1.8	.5	.2	22.8	7.3	0
30	0		.6	10.0	0	0	13.0	1.8	0	4.3	1.4	0
31	0		0		0		* 6.8	1.8		.3		0
Sum	179.0	173.1	148.9	135.5	58.3	14.6	221.0	164.1	40.4	132.3	178.1	162.3

Month	Current Year 1989 Extreme Gage Feet High	Extreme Gage Feet Low	Extreme Second-Feet High Day	Extreme Second-Feet High	Extreme Second-Feet Low Day	Extreme Second-Feet Low	Average Second-Feet	Total Acre-Feet	Period 1935-1989 Acre-Feet Average	Maximum	Minimum
Jan.	2.33	0	22	115	!20	0	5.8	355	2,461	9,570	0
Feb.	.99	.01	17	43.4	! 1	0	6.2	343	2,017	8,430	14.5
Mar.	2.95	0	5	167	! 8	0	4.8	295	1,896	6,230	59.1
Apr.	3.16	0	2	186	! 1	0	4.5	269	1,753	6,300	0
May	1.72	0	1	77.3	! 4	0	1.9	116	2,068	9,320	8.3
June	.42	0	19	9.2	! 1	0	.5	29.0	1,965	7,440	10.5
July	3.84	0	27	263	! 1	0	7.1	438	1,981	8,320	9.1
Aug.	4.38	0	12	310	! 1	0	5.3	325	1,715	9,740	51.8
Sept.	1.81	0	17	79.2	! 1	0	1.3	80.1	1,237	6,140	6.0
Oct.	1.51	0	16	72.7	! 1	0	4.3	262	1,690	5,680	11.9
Nov.	2.66	0	5	142	! 1	0	5.9	353	2,055	8,220	18.8
Dec.	3.83	0	3	251	! 1	0	5.2	322	2,688	9,430	61.9
Yearly	4.38	0		310		0	4.4	3,187	23,526	82,900	943
	Meters			Cubic Meters per Second				Thousands of Cubic Meters			
	1.34	0		8.78		0	0.12	3,931	29,019	102,255	1,163

\# Discharge measurement made on this day ! And other days " Estimated
* Partly estimated

09-5221.00 COLORADO RIVER AT ELEVEN MILE GAGE - STAGES

DESCRIPTION: Water-stage recorder on the left (Arizona) bank of the river, 4.3 miles (6.9 km) downstream from northerly international boundary, 3.2 miles (5.1 km) downstream from Morelos Diversion Dam, about 50 feet (15 m) downstream from the mouth of Eleven Mile Wasteway of the Yuma Project, and 11 miles (17.7 km) downstream from Yuma, Arizona, along the river levee. The zero of the gage is at mean sea level, U. S. C. & G. S. datum. On April 1, 1988, the gage was relocated 1,310 ft. downstream of the old gage on the left bank. Zero of the new gage is at mean sea level, U. S. C. & G. S. datum. Elevation of the new gage is 0.38 ft. lower than the old gage.

RECORDS: Mean daily gage heights based on continuous water-stage records. Records available: Continuous record of gage heights, November 1947 through 1989; once weekly readings obtained by the U. S. Bureau of Reclamation, January 1940 through October 1947.

REMARKS: This station is maintained by the United States Section of the Commission as part of the continuing study of channel conditions in the limitrophe section of the river.

EXTREMES: Since November 1947, maximum mean daily gage height, 108.77 feet (33.15 m) on June 28, 1983; minimum mean daily gage height, 93.98 feet (28.65 m) on April 6, 1989 and May 21, 1989.

MEAN DAILY GAGE HEIGHT IN FEET 1989

Day	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	94.31	94.19	94.24	94.07	94.50	94.03	94.04	94.30	94.25	94.28	94.33	94.23
2	94.84	94.17	94.28	94.43	94.14	94.02	94.05	94.23	94.26	94.43	94.29	94.18
3	94.21	94.24	94.31	94.21	94.06	94.04	94.08	94.21	94.25	94.41	94.44	94.61
4	96.90	94.25	94.26	94.05	94.05	94.02	94.07	94.20	94.22	94.36	94.29	94.46
5	99.10	94.23	94.76	94.02	94.06	94.02	94.11	94.19	94.27	94.28	94.43	94.24
6	98.05	94.19	94.34	93.98	94.06	94.03	94.08	94.18	94.29	94.31	94.54	94.27
7	96.33	94.14	94.27	93.99	94.06	94.03	94.08	94.17	94.23	94.28	94.33	94.22
8	94.79	94.21	94.27	94.01	94.07	94.00	94.08	94.17	94.22	94.32	94.31	94.21
9	94.27	94.23	94.21	94.00	94.07	94.00	94.08	94.47	94.23	94.34	94.24	94.17
10	94.28	94.19	94.21	94.01	94.07	94.02	94.08	98.55	94.23	94.31	94.23	94.19
11	95.02	94.30	94.22	94.01	94.04	94.02	94.08	98.49	94.25	94.31	94.23	94.19
12	96.06	94.31	94.24	94.02	94.03	94.03	94.11	95.91	94.26	94.29	94.32	94.18
13	94.28	94.32	94.24	94.04	94.03	94.03	94.15	94.40	94.29	94.30	94.25	94.17
14	94.15	94.23	94.21	94.05	94.02	94.04	94.09	94.35	94.25	94.31	94.25	94.17
15	94.14	94.24	94.23	94.00	94.02	94.07	94.05	95.70	94.26	94.32	94.26	94.18
16	94.12	94.45	94.21	94.01	94.01	94.04	94.06	94.81	94.25	94.38	94.25	94.19
17	94.18	95.40	94.15	94.07	94.03	94.03	94.12	94.32	94.32	94.35	94.36	94.18
18	94.14	94.26	94.17	94.05	94.03	94.04	94.10	94.26	94.28	94.35	94.25	94.21
19	94.11	94.32	94.18	94.08	94.02	94.08	94.12	94.25	94.28	94.31	94.23	94.36
20	94.11	94.29	94.14	94.12	94.00	94.06	94.13	94.26	94.25	94.46	94.22	94.21
21	94.16	94.21	94.09	94.09	93.98	94.07	94.08	94.24	94.33	94.33	94.21	94.17
22	94.19	94.24	94.10	94.09	94.00	94.07	94.07	94.26	94.27	94.32	94.27	94.17
23	94.36	94.26	94.12	94.06	94.01	94.06	94.30	94.39	94.28	94.32	94.22	94.27
24	94.17	94.26	94.12	94.06	94.01	94.05	94.27	94.27	94.29	94.52	94.28	94.30
25	94.14	94.25	94.10	94.06	94.03	94.05	94.12	94.26	94.27	94.38	94.28	94.15
26	94.10	94.24	94.14	94.05	94.02	94.06	94.11	94.24	94.31	94.31	94.46	94.20
27	94.18	94.33	94.08	94.03	94.02	94.05	94.18	94.24	94.30	94.30	94.47	94.25
28	94.11	94.21	94.07	94.04	94.02	94.05	98.51	94.25	94.29	94.30	94.25	94.19
29	94.12		94.08	94.06	94.03	94.04	97.92	94.25	94.29	94.52	94.28	94.19
30	94.12		94.07	94.13	94.03	94.06	95.94	94.36	94.28	94.35	94.21	94.18
31	94.12		94.05		94.03		95.30	94.32		94.30		94.18
Avg.	94.75	94.29	94.20	94.06	94.05	94.04	94.47	94.66	94.27	94.34	94.30	94.23

09-5330.00 TWENTY-ONE MILE WASTEWAY (VALLEY DIVISION, YUMA PROJECT)

DESCRIPTION: Water-stage recorder and control weir on wasteway from West Main Canal to Colorado River. Located on east side of levee at site used prior to May 1, 1971. The site used May 1, 1971 to September 20, 1977 was located 200 feet (61 m) downstream from present site on west side of levee. This wasteway is located in Arizona, 18.5 miles (29.8 km) downstream from the northerly international boundary, 17.4 miles (28.0 km) downstream from Morelos Diversion Dam, and 2.2 miles (3.5 km) upstream from the southerly international boundary. It is the farthest downstream of the two wasteways discharging waste water from the Valley Division of the Yuma Project in the United States into the limitrophe section of the Colorado River. The elevation of the zero of the gage at the new location has not been determined.

RECORDS: Flow is computed from head on the weir measured by the water-stage recorder and weir rating determined by current meter measurements. Station operated by the United States Section of the Commission. Records available: Daily discharge, January 1951 through 1989, obtained by the United States Section; monthly discharge, March 1939 through 1950, by Bureau of Reclamation.

REMARKS: This wasteway was completed and flow began March 14, 1939. Since May 13, 1944, waste water from the West Main Canal which previously discharged across the southerly land boundary has been returned to the Colorado River through this wasteway. The West Main Canal Wasteway was completed in February of 1971, and the waste water from the West Main Canal is normally discharged across the southerly land boundary.

EXTREMES: Prior to January 1951, maximum monthly discharge 2,860 acre-feet (3,528,000 m3) in January 1946; minimum monthly discharge, 122 acre-feet (150,000 m3) in September 1950. Since January 1, 1951, maximum instantaneous discharge, 102 second-feet (2.89 m3/sec) on January 24, 1954, at a maximum gage height of 95.46 feet (29.10 m) (old datum); minimum instantaneous discharge, zero during a part of most months.

Mean Daily Discharge in Second-Feet 1989 —— Annual and Period Summary

Day	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	9.0	2.1	1.1	0.2	0.5	0	0	0	0	0	0	0
2	1.8	1.6	1.5	5.4	0	0	0	0	0	0	0	0
3	2.2	1.5	1.3	12.4	0	0	0	0	0	0	0	0
4	3.2	1.3	1.5	.2	0	0	0	0	0	0	0	.1
5	1.3	1.4	5.0	0	0	0	0	0	0	6.3	0	0
6	2.1	1.3	6.3	.1	0	0	0	0	0	0	0	0
7	1.8	1.2	0	.5	0	0	0	0	0	0	0	0
8	1.9	1.4	0	.1	0	0	0	0	0	0	0	0
9	1.9	# 1.4	1.2	1.1	0	0	0	5.4	0	0	0	0
10	1.6	2.1	4.2	2.4	0	0	0	1.1	0	0	0	0
11	2.1	3.6	1.5	2.0	0	0	0	0	0	0	0	0
12	3.3	1.8	1.7	1.7	0	0	0	0	0	0	0	0
13	2.5	1.9	2.0	1.5	0	0	0	0	0	0	0	0
14	1.7	1.9	2.4	1.9	0	0	0	0	0	0	0	0
15	1.5	2.2	1.8	2.2	0	0	0	0	0	0	0	0
16	1.9	1.7	1.7	2.0	0	0	0	0	0	0	0	0
17	2.0	1.6	1.5	1.7	0	0	0	0	0	0	0	0
18	3.1	1.1	1.7	1.1	0	0	0	0	0	0	0	0
19	2.6	.9	2.0	1.4	0	0	0	0	0	0	0	0
20	2.5	1.3	1.9	1.4	0	0	0	0	0	0	0	0
21	1.9	1.6	1.7	1.9	0	0	0	0	0	0	0	0
22	1.7	1.3	1.4	1.3	0	0	0	0	0	0	0	0
23	7.0	.8	# 1.1	.9	0	0	0	0	0	0	0	0
24	.9	.4	1.2	1.0	0	0	0	0	0	0	0	0
25	0	.3	.6	1.0	0	0	0	0	0	0	0	0
26	9.7	.2	.6	1.3	0	0	0	0	0	0	0	0
27	7.2	.3	.9	2.1	0	0	5.3	0	0	0	0	0
28	1.7	.5	.5	# 2.0	0	0	9.3	0	0	0	0	0
29	1.4		.2	1.4	0	0	.8	0	0	0	0	0
30	1.2		.2	1.1	0	0	.3	0	0	0	0	0
31	1.4		.1		0		# 1.5	0		0		0
Sum	84.1	38.7	48.8	53.3	0.5	0	17.2	6.5	0	6.3	0	0.1

Month	Current Year 1989							Period 1939-1989		
	Extreme Gage Feet		Extreme Second-Feet				Average Second-Feet	Total Acre-Feet	Acre-Feet		
			High		Low						
	High	Low	Day	High	Day	Low			Average	Maximum	Minimum
Jan.	1.78	0	1	40.7	!24	0	2.7	167	610	2,860	0
Feb.	.99	.05	10	15.8	!26	.1	1.4	76.8	524	2,510	0
Mar.	1.88	0	10	43.7	! 6	0	1.6	96.8	477	1,660	0
Apr.	1.58	0	3	32.9	! 1	0	1.8	106	510	1,940	0
May	.77	0	1	10.3	! 2	0	0	1.0	618	2,470	0
June	0	0		0		0	0	0	544	2,350	0
July	1.81	0	28	41.8	! 1	0	.6	34.1	472	1,950	0
Aug.	1.82	0	9	42.2	! 1	0	.2	12.9	493	2,530	0
Sept.	0	0		0		0	0	0	438	2,180	0
Oct.	2.11	0	5	53.5	! 1	0	.2	12.5	545	2,100	0
Nov.	0	0		0		0	0	0	653	2,380	0
Dec.	.84	0	4	12.1	! 1	0	0	.2	694	2,680	0
Yearly	2.11	0		53.5		0	0.7	507	6,578	24,370	0
	Meters		Cubic Meters per Second					Thousands of Cubic Meters			
	0.64	0		1.52		0	0.02	625	8,114	30,060	0

Discharge measurement made on this day ! And other days

09-5345.00 EAST MAIN CANAL WASTEWAY (VALLEY DIVISION, YUMA PROJECT)

DESCRIPTION: Water-stage recorder and control weir located about 300 feet (91.4 m) north of the international boundary near San Luis, Arizona and 1.5 miles (2.4 km) east of the Colorado River. From September 28, 1977 to April 6, 1978, recorder moved west 100 feet (30.5 m) to a temporary bypass channel. On April 7, 1978 recorder was moved back to original site.
RECORDS: Wasteway discharges computed by United States Section of the Commission beginning November 1, 1953, from head on control weir as measured by water-stage recorder and weir ratings as determined by current meter measurements. Records available: October 1946 through 1989. Records of monthly discharges also are available for the periods January 1924 through June 1928, January 1932 through 1933, and April 1935 through September 1946.
REMARKS: Wasteway discharges from the East Main Canal comprise regulatory waste and drainage waters from the eastern half of the Valley Division of the Yuma Project and are considered as part of the volumes arriving at the limitrophe section of the Colorado River.

Mean Daily Discharge in Second-Feet 1989 —— Annual and Period Summary

Day	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	7.5	0	0	4.6	8.0	6.0	0.3	2.1	0.5	7.2	13.0	3.0
2	12.2	5.7	3.6	4.8	6.4	1.5	1.2	.6	.6	3.9	12.8	4.0
3	11.6	8.5	9.6	7.7	1.1	.2	2.8	0	.4	1.0	1.3	6.1
4	9.0	19.2	.5	3.5	.2	.5	3.0	.3	1.6	1.0	12.8	4.1
5	13.5	9.8	16.5	0	2.9	.1	.3	.2	.7	6.1	14.6	3.7
6	12.2	# 12.1	7.7	1.2	10.6	.5	2.3	.9	.1	4.1	5.4	.6
7	10.5	.5	4.6	.2	4.0	2.1	4.0	1.0	.8	8.5	1.3	5.8
8	2.9	.1	.4	0	5.0	4.0	2.5	1.5	9.5	13.4	11.8	4.4
9	.3	.1	.7	0	# 5.7	2.8	.5	.5	7.6	11.2	1.0	1.3
10	0	12.1	0	5.6	.5	.4	2.3	16.0	12.1	9.4	5.0	.2
11	3.7	15.4	.1	# 6.7	1.7	0	1.7	22.0	5.9	6.6	3.3	.3
12	8.2	2.8	3.0	2.1	5.2	3.5	.1	6.4	2.9	9.7	1.8	7.2
13	7.3	5.6	3.3	2.8	1.6	.3	.1	.8	2.0	13.0	8.4	2.5
14	.7	1.1	.4	.1	9.1	.1	0	.1	2.9	10.5	11.8	8.0
15	5.2	7.7	.3	6.4	11.7	0	.9	4.0	2.8	3.0	15.4	9.4
16	10.1	13.3	.5	24.3	10.9	.9	1.2	5.0	3.1	7.5	11.8	1.5
17	12.6	7.9	.5	9.5	11.3	.2	2.0	14.1	.9	8.4	18.0	9.5
18	3.3	4.5	1.7	.2	9.7	0	2.1	10.4	0	# 12.2	5.0	4.0
19	.5	4.4	14.2	.7	1.1	0	3.7	11.6	0	1.3	12.8	4.5
20	13.5	4.8	13.1	.1	.9	.8	3.7	9.3	0	4.0	22.5	2.6
21	3.4	1.0	.8	1.3	7.3	1.5	5.5	8.5	3.3	5.7	2.0	1.9
22	5.2	1.9	0	3.4	3.5	8.7	.3	2.9	.7	2.1	.3	11.6
23	19.5	.8	0	0	.4	20.8	.2	1.4	10.1	1.8	.1	14.7
24	3.1	3.0	.1	.5	.2	3.8	.1	13.5	9.5	1.6	6.9	14.7
25	.1	6.8	.3	2.7	.1	2.9	2.4	# 14.9	8.8	8.8	.4	.7
26	.3	2.2	0	0	10.9	1.2	# 4.7	20.2	.7	1.5	0	.5
27	.1	8.9	0	" .1	1.4	.5	8.7	8.1	.5	9.2	.6	.2
28	0	.1	0	" .1	10.3	.3	25.1	4.4	3.1	17.0	1.8	17.0
29	5.4		3.5	" 6.8	6.4	.2	4.2	2.7	2.9	2.9	# 8.3	10.8
30	3.5		16.5	" 7.5	.2	.2	.2	9.7	0	.9	3.1	12.4
31	.8		5.0		5.8		.1	1.3		.8		* 13.9
Sum	186.2	160.3	106.9	102.9	154.1	64.0	86.2	194.4	94.0	194.3	213.3	181.1

Month	Current Year 1989								Period 1935-1989		
	Extreme Gage Feet		Extreme Second-Feet				Average Second-Feet	Total Acre-Feet	Acre-Feet		
			High		Low						
	High	Low	Day		Day				Average	Maximum	Minimum
Jan.	1.07	0	3	39.7	! 9	0	6.0	369	956	3,360	90.0
Feb.	1.29	0	10	55.3	! 1	0	5.7	318	801	3,170	133
Mar.	1.07	0	5	39.7	! 1	0	3.4	212	918	2,920	142
Apr.	1.04	0	16	37.7	! 5	0	3.4	204	899	3,170	175
May	1.16	0	26	45.8	! 5	0	5.0	306	1,001	3,040	228
June	1.07	0	22	39.7	! 3	0	2.1	127	848	3,660	127
July	1.08	0	27	40.4	!12	0	2.8	171	906	3,590	170
Aug.	.97	0	10	33.3	! 1	0	6.3	386	932	3,960	159
Sept.	.85	0	23	26.4	! 5	0	3.1	186	893	3,170	159
Oct.	1.04	0	28	37.7	! 1	0	6.3	385	932	3,280	307
Nov.	1.06	0	20	39.0	123	0	7.1	423	1,009	3,570	241
Dec.	1.28	.01	22	54.6	!10	0	5.8	359	975	3,080	247
Yearly	1.29	0		55.3		0	4.8	3,446	11,070	38,310	3,026
	Meters		Cubic Meters per Second					Thousands of Cubic Meters			
	0.39	0		1.57		0	0.14	4,251	13,655	47,255	3,733

\# Discharge measurement made on this day ! And other days " Estimated
* Partly estimated

09-5340.00 YUMA MAIN DRAIN (VALLEY DIVISION, YUMA PROJECT)

DESCRIPTION: Water-stage recorders located in the forebay and afterbay, with flow meters in the four discharge pipes at the Boundary Pumping Plant on the Main Drain about 200 feet (61 m) north of the international boundary near San Luis, Arizona, 1.3 miles (2.1 km) east of the Colorado River.

RECORDS: Main Drain discharges are lifted 10 (3.05) to 12 feet (3.66 m) at the pumping plant. Prior to April 1, 1969, discharges were computed from pump ratings and the differential head measured by the two gages. Beginning April 1, 1969 discharges were computed from flow meter charts. Pump ratings and flow meter discharges are checked by current meter measurements. Records obtained and computed by the United States Section of the Commission. Records available: Monthly discharges, June 1919 through 1951; daily discharges January 1952 through 1989.

REMARKS: Flows in the Main Drain are principally drainage waters from the Valley Division of the Yuma Project. The Main Drain, the East Main Canal Wasteway, West Main Canal Wasteway, and 242 Lateral discharge into Mexico at the international land boundary near San Luis, Sonora. The water is used for irrigation in Mexico on the left (Sonora) bank of the Colorado River and is considered as part of the volumes arriving at the limitrophe section of the river.

Mean Daily Discharge in Second-Feet 1989 —— Annual and Period Summary

Day	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	127	127	127	140	137	97.0	120	54.7	126	154	161	144
2	115	119	130	137	123	107	106	79.1	145	141	163	152
3	127	122	131	141	122	112	109	60.3	132	151	167	141
4	132	129	131	139	118 #	117	105	85.8	134	157	163	136
5	132	131	125	134	114	115	102	77.7	123	157	169	131
6	136	124	140	127	126	106	104	126	123	154	175	131
7	120	122	117	131	129	95.0	111 #	101	128	153	158	135
8	118	118	110	132	126	107	116	97.3	134	169	141	138 #
9	120	120	118	135	133	102	116	103	143	166	160	132
10	123	116	115	135	125	109	111	150	140	157	164	151
11	122	118	131	132	130	112	95.0	115	149	157	159	133
12	136	119	143	133	124	105	90.0	93.8	130	172	163	139
13	127	119	104	134	132	95.6	99.0	92.7	128	161	169 #	135
14	117	124	122	131	128	94.6	110	90.8	125	165	165	137
15	113	116	132	135	125	107	110	102	116	170	154	131
16	119	132	132	144	126	113 #	117	105	133	167 #	154	131
17	137 #	119	133	143	134 #	131	110	97.7	104	161	141	145
18	132	119	133	134	129	123	105	108	122	165	144	128
19	133	131	144	132	129	115	116	116	131	160	167	122
20	124	124	146	136	127	124	118	110	124 #	163	162	120
21	122	92.0	127	137 #	122	120	113	110	128	159	146	120
22	136	116	124	136	120	131	119	111	135	161	150	131
23	129	116	125	142	117	117	123	123	133	162	146	125
24	120	114 #	124	132	116	109	121	114	151	157	139	131
25	119	120	124	126	131	114	110	112 #	144	149	144	117
26	113	113	131	134 #	130	106	102	118	155	144	162	116
27	145	122	126	141	129	103	88.7	119	158	162	153	118
28	128	133	131	134	125	109	123	110	165	161	137	129
29	119		136 #	146	123	115	123	123	165	161	132	121
30	108		128	143	120	115	101	125	147	155	140	120
31	117		128		124		69.7	115		134		119
Sum	3,866	3,375.0	3,968	4,076	3,894	3,326.2	3,363.4	3,245.9	4,071	4,905	4,648	4,059

Current Year 1989									Period 1935-1989		
Month	Extreme Gage Feet		Ø Extreme Second-Feet				Average Second-Feet	Total Acre-Feet	Acre-Feet		
			High		Low				Average	Maximum	Minimum
	High	Low	Day		Day						
Jan.			27	145	30	108	125	7,668	7,618	11,203	1,740
Feb.			28	133	21	92.0	121	6,694	7,427	11,988	1,640
Mar.			20	146	13	104	128	7,870	8,522	12,430	1,940
Apr.			29	146	25	126	136	8,085	8,399	11,890	1,920
May			1	137	5	114	126	7,724	8,573	13,140	1,950
June			!17	131	14	94.6	111	6,597	7,956	12,040	2,290
July			123	123	31	69.7	108	6,671	7,917	11,930	2,530
Aug.			10	150	1	54.7	105	6,438	7,906	11,960	2,560
Sept.			!28	165	17	10!	136	8,075	7,925	11,568	2,280
Oct.			12	172	31	134	158	9,729	8,927	12,385	2,940
Nov.			6	175	29	132	155	9,219	8,500	12,010	2,800
Dec.			2	152	26	116	131	8,051	8,103	11,480	2,450
				175		54.7	128	92,821	97,773	139,380	27,040
Yearly	Meters		Cubic Meters per Second					Thousands of Cubic Meters			
				4.96		1.55	3.62	114,493	120,601	171,922	33,353

\# Discharge measurement made on this day Ø Mean daily ! And other days

09-5343.00 WEST MAIN CANAL WASTEWAY (VALLEY DIVISION, YUMA PROJECT)

DESCRIPTION: Water-stage recorder located about 0.3 mile (0.5 km) upstream from outlet to Yuma Main Drain, which is 175 feet (53.3 m) upstream from East Main Canal Wasteway outlet and 0.4 mile (0.6 km) west of San Luis, Arizona. Prior to August 1, 1975, the recorder was located about 150 feet (45.7 m) upstream from outlet to Yuma Main Drain.
RECORDS: Wasteway discharges computed by United States Section of the Commission beginning February 23, 1971, from water-stage recorder and ratings as determined by current meter measurements. Records available: February 23, 1971 through 1989.
REMARKS: Wasteway discharges from West Main Canal Wasteway comprise regulatory waste from the West Main Canal.

Mean Daily Discharge in Second-Feet 1989 —— Annual and Period Summary

Day	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	27.8	21.9	9.4	7.9	# 14.9	3.6	3.5	2.1	4.4	1.6	8.9	11.1
2	14.6	16.6	16.2	7.1	2.7	10.1	9.6	8.3	16.3	7.0	4.2	7.8
3	10.0	19.7	10.5	# 10.5	.4	6.4	8.5	9.6	15.1	.1	8.0	34.3
4	25.6	10.2	33.3	4.8	.1	6.6	8.3	4.7	6.3	3.3	10.2	33.8
5	13.3	17.6	36.3	2.6	5.2	2.1	9.5	2.2	5.1	15.4	26.2	6.7
6	14.7	10.2	2.4	.5	5.1	6.0	1.1	10.4	10.1	.1	22.6	1.2
7	12.1	17.6	.3	6.2	16.7	6.7	6.0	7.5	5.6	1.5	2.0	6.5
8	14.0	17.0	0	.5	5.2	5.1	1.8	1.5	4.7	13.2	.4	# 12.0
9	15.1	21.0	1.2	5.1	# 9.3	6.6	1.1	10.1	1.4	13.7	9.0	19.0
10	19.4	10.5	12.9	6.6	7.1	5.5	10.2	3.5	4.6	1.4	8.0	10.1
11	12.5	8.4	7.3	# 5.4	7.1	14.5	8.0	0	12.7	13.3	8.4	13.9
12	19.1	17.7	21.7	2.3	9.6	11.3	10.0	15.7	8.6	15.0	9.6	10.3
13	14.8	# 13.0	22.8	7.2	14.7	7.2	11.4	5.4	2.9	8.4	10.0	10.5
14	9.3	16.8	10.8	1.0	14.3	11.7	5.9	8.3	3.3	3.9	6.1	9.2
15	8.7	18.4	8.9	2.2	16.4	3.9	7.2	8.0	5.9	13.6	5.5	18.1
16	17.8	19.6	13.3	9.0	11.5	7.5	10.5	9.3	0	14.2	2.8	8.1
17	3.5	11.6	9.0	10.3	7.0	8.5	11.3	# 16.0	3.2	5.5	14.6	15.2
18	5.4	4.6	14.0	# 6.7	6.4	7.6	1.7	13.6	.5	# 11.3	9.8	13.7
19	11.5	6.6	9.1	13.7	5.1	9.6	1.9	10.4	# 13.4	14.7	6.5	7.3
20	11.7	15.2	14.1	13.4	10.0	4.2	.6	15.1	4.2	6.7	1.7	11.5
21	19.4	4.0	14.1	# 14.3	6.3	10.9	13.0	9.6	21.2	5.5	14.1	13.6
22	14.5	0	11.3	6.3	5.9	12.5	8.2	1.2	10.5	6.7	14.0	15.0
23	19.4	1.6	# 11.6	7.3	8.2	14.4	17.9	11.4	10.7	# 8.9	11.5	21.2
24	1.4	8.3	10.1	7.9	6.1	17.9	21.8	8.5	16.4	6.0	15.3	9.6
25	.4	4.3	8.2	7.0	# 4.3	16.2	5.6	2.5	20.7	5.5	14.8	1.9
26	.9	7.0	9.6	# 7.6	4.4	7.4	.5	10.0	# 18.7	1.0	35.6	.8
27	13.7	10.8	10.0	4.0	16.0	3.4	6.7	3.9	11.1	5.1	16.1	15.7
28	23.5	12.1	9.0	2.9	11.5	6.7	17.2	2.1	9.1	1.1	22.4	12.7
29	16.3		9.8	2.7	7.8	9.3	4.2	13.8	7.9	4.8	# 11.4	15.1
30	13.8		8.4	3.4	9.4	7.0	2.2	9.1	8.7	8.2	15.8	25.1
31	6.6		# 7.2		8.0		6.3	10.2		7.4		14.9
Sum	410.8	342.3	362.8	186.4	256.7	250.4	231.7	244.0	263.3	224.1	345.5	405.9

Current Year 1989 — **Period 1971-1989**

Month	Extreme Gage Feet		Extreme Second-Feet				Average Second-Feet	Total Acre-Feet	Acre-Feet		
			High		Low						
	High	Low	Day		Day				Average	Maximum	Minimum
Jan.	2.32	0.03	1	54.5	!13	0	13.3	815	371	815	39.5
Feb.	2.14	.01	! 1	39.9	!18	0	12.2	679	423	681	159
Mar.	2.58	.01	! 5	52.9	! 1	0	11.7	720	450	939	203
Apr.	2.12	0	20	38.1	! 6	0	6.2	370	344	664	164
May	1.84	0	1	35.2	! 3	0	8.3	509	313	509	148
June	2.16	0	23	48.6	! 3	0	8.3	497	298	497	45.2
July	2.22	0	28	51.3	! 1	0	7.5	460	295	556	62.7
Aug.	2.09	0	9	45.4	! 1	0	7.9	484	331	770	98.0
Sept.	2.09	.01	27	45.6	! 4	0	8.8	522	379	768	190
Oct.	1.97	0	16	34.9	! 3	0	7.2	444	361	728	133
Nov.	2.23	.03	! 5	45.1	!18	.1	11.5	685	348	685	26.2
Dec.	2.36	.04	3	49.1	!16	.1	13.1	805	408	976	35.3
Yearly	2.58	0		54.5		0	9.7	6,990	4,321	6,990	2,577
	Meters		Cubic Meters per Second					Thousands of Cubic Meters			
	0.79	0		1.54		0	0.27	8,622	5,330	8,622	3,179

\# Discharge measurement made on this day ! And other days

09-5345.50 242 WELL FIELD NEAR SAN LUIS, ARIZONA

DESCRIPTION: Water-stage recorder and 12-foot (3.7 m) Parshall flume located 100 feet (30.5 m) upstream from confluence of East Main Canal Wasteway, 110 feet (33.5 m) north of the southerly land boundary, and 1.4 miles (2.3 km) east of the Colorado River.
RECORDS: Based on current meter measurements and a continuous record of gage heights. The station is operated by the United States Section of the Commission. Records available: October 18, 1978 through 1989.
REMARKS: Records show the pumping of ground water from the 242 well field east of San Luis, Arizona.

Mean Daily Discharge in Second-Feet 1989 —— Annual and Period Summary

Day	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	7.7	41.8	49.2	34.0	47.5	56.6	53.9	54.2	54.4	24.5	10.5	9.8
2	4.6	51.3	52.5	22.1	56.5	57.2	54.3	53.7	51.0	21.2	10.0	9.7
3	0	57.9	50.1	35.9	54.9	55.2	54.9	52.9	50.3	27.5	11.8	11.3
4	0	58.1	49.8	47.6	53.5	55.4	55.2	54.9	51.3	15.4	11.2	13.9
5	21.3	58.1	52.6	51.4	56.6	57.5	55.7	55.1	51.1	0	12.0	11.4
6	37.5	56.0	31.0	47.7	52.5	57.3	59.5	53.1	50.7	0	11.9	11.8
7	37.6	58.5	39.8	51.4	55.6	56.9	# 58.0	25.2	50.6	0	11.4	13.5
8	37.5	59.4	52.6	48.8	54.7	54.6	53.2	15.5	53.9	0	9.4	14.7
9	37.8	59.1	# 59.4	51.3	54.8	58.0	52.5	27.1	55.0	0	# 11.5	15.0
10	37.8	57.5	59.3	51.0	56.8	56.4	55.7	5.4	57.5	9.7	9.5	15.0
11	37.8	57.4	56.7	# 49.7	57.9	54.6	55.1	.1	30.2	22.9	7.5	11.1
12	19.6	57.1	58.5	48.0	59.4	53.4	54.1	33.5	0	13.5	7.1	23.3
13	24.4	57.3	56.3	49.9	57.2	53.4	54.4	53.5	0	13.1	8.1	29.9
14	37.9	56.3	59.0	52.6	58.8	54.4	54.4	55.4	11.9	13.1	6.6	30.0
15	37.6	56.9	55.2	54.6	60.6	54.7	53.3	53.1	24.6	13.1	3.6	39.1
16	36.4	54.6	# 57.0	36.4	58.7	58.6	53.0	52.1	22.2	13.1	4.5	45.5
17	38.2	# 53.7	58.6	43.1	55.4	57.7	53.9	53.9	20.8	13.1	9.4	45.5
18	39.2	54.0	39.3	51.6	55.5	54.9	59.1	58.3	21.3	13.1	9.2	44.7
19	40.2	51.9	30.1	# 53.6	60.4	54.8	53.5	54.1	25.7	12.9	11.8	44.8
20	40.2	51.1	44.4	53.8	56.5	# 54.0	53.9	55.7	28.2	12.6	13.2	45.1
21	40.3	48.3	58.0	53.0	59.7	54.0	56.9	53.2	24.7	11.4	12.9	43.9
22	40.5	50.7	58.1	55.8	55.8	52.9	52.1	52.5	25.5	9.8	10.2	44.4
23	40.5	51.6	55.5	57.6	54.8	55.4	31.4	51.2	23.5	7.3	11.0	45.5
24	41.1	50.7	53.0	52.2	# 54.8	52.0	38.6	52.4	22.6	6.3	10.9	45.5
25	39.1	49.9	54.2	55.3	54.3	52.2	53.6	# 57.6	22.0	5.6	10.6	45.5
26	39.6	46.3	58.5	53.2	59.5	52.5	56.5	55.1	8.2	8.3	12.9	45.1
27	40.6	47.8	58.7	54.2	57.7	51.4	43.3	55.7	11.7	12.3	12.3	# 41.5
28	40.2	49.7	55.9	56.4	56.5	52.3	.3	52.4	23.2	9.1	9.3	44.2
29	40.3		58.5	59.3	56.0	52.0	0	50.3	# 24.4	6.5	# 10.9	45.0
30	38.6		55.0	41.9	54.5	54.3	0	50.5	25.4	11.3	9.7	53.9
31	39.3		58.5		57.6		26.9	52.4		12.4		57.9
Sum	1,013.4	1,503.0	1,635.3	1,473.4	1,745.0	1,644.6	1,457.2	1,450.1	921.9	339.1	300.9	997.5

Current Year 1989									Period 1979-1989		
Month	Extreme Gage Feet		Extreme Second-Feet				Average Second-Feet	Total Acre-Feet	Acre-Feet		
			High		Low				Average	Maximum	Minimum
	High	Low	Day		Day						
Jan.	0.96	0	24	46.1	! 2	0	32.7	2,010	509	2,761	0
Feb.	1.18	.87	! 6	60.0	1	38.6	53.7	2,981	662	2,981	0
Mar.	1.24	.54	28	63.9	18	18.1	52.8	3,244	628	3,244	0
Apr.	1.17	.51	! 1	16.6	!25	60.0	49.1	2,922	664	2,922	0
May	1.22	.77	19	64.7	1	32.0	56.3	3,461	969	3,461	11.3
June	1.26	1.03	23	68.0	! 3	49.9	54.8	3,262	923	3,262	21.4
July	1.31	0	26	72.1	!28	0	47.0	2,890	908	3,020	16.3
Aug.	1.17	0	31	60.7	! 7	0	46.8	2,876	782	2,876	0
Sept.	1.18	0	9	61.5	!11	0	30.7	1,829	809	2,326	0
Oct.	.72	0	!10	28.8	! 5	0	10.9	673	584	2,711	0
Nov.	.47	.14	30	15.0	15	2.3	10.0	597	220	1,011	0
Dec.	1.15	.18	30	59.1	2	3.4	32.2	1,979	605	2,962	0
Yearly	1.31	0		72.1		0	39.7	28,724	8,263	28,724	163
	Meters		Cubic Meters per Second					Thousands of Cubic Meters			
	0.40	0		2.04		0	1.12	35,430	10,192	35,430	201

\# Discharge measurement made on this day ! And other days

09-5348.00 TOTAL FLOWS CROSSING INTERNATIONAL BOUNDARY INTO MEXICO NEAR SAN LUIS, SONORA

DESCRIPTION: The tabulated data below are the combined flows of the East Main Canal Wasteway, West Main Canal Wasteway, 242 Lateral, and the Yuma Main Drain and represent the total water crossing the international land boundary into the Sanchez Mejorada Canal near San Luis, Arizona. The mean daily discharges are combined and rounded and the monthly volumes are obtained by adding the volumes of the four stations.
RECORDS: Records obtained and computed by the United States Section of the Commission. Records available: February 23, 1971 through 1989; 242 Lateral from November 1978 through 1989.
REMARKS: Descriptions and flows of the individual stations, East Main Canal Wasteway, West Main Canal Wasteway, the Yuma Main Drain, and 242 Lateral are published separately on preceding pages of this bulletin.

Mean Daily Discharge in Second-Feet 1989 —— Annual and Period Summary

Day	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	170	191	186	187	207	163	178	113	185	187	193	168
2	146	193	202	171	189	176	171	142	213	173	190	174
3	149	208	201	195	178	174	175	123	198	180	188	193
4	167	217	215	195	172	180	172	146	193	177	197	188
5	180	217	230	188	179	175	168	135	180	179	222	153
6	200	202	181	176	194	170	167	190	184	158	215	145
7	180	199	162	189	205	161	179	135	185	163	173	161
8	172	195	163	181	191	171	174	116	202	196	163	169
9	173	200	179	191	203	169	170	141	207	191	182	167
10	180	196	187	198	189	171	179	175	214	178	187	176
11	176	199	195	194	197	181	160	137	198	200	178	158
12	183	197	226	185	198	173	154	149	142	210	182	180
13	174	195	186	194	206	157	165	152	133	196	196	178
14	165	198	192	185	210	161	170	155	143	193	190	184
15	165	199	196	198	214	166	171	167	149	200	179	198
16	183	220	203	214	207	180	182	171	158	202	173	186
17	191	192	201	206	208	197	177	182	129	188	183	215
18	180	182	188	193	201	186	168	190	144	202	168	190
19	185	194	197	200	196	179	175	192	170	189	198	179
20	189	195	218	203	194	183	176	190	156	186	199	179
21	185	145	200	206	195	186	188	181	177	182	175	179
22	196	169	193	202	185	205	180	168	172	180	175	202
23	208	170	192	207	180	208	173	187	177	180	169	206
24	166	176	187	193	177	183	182	188	200	171	172	201
25	159	181	187	191	190	185	172	187	196	169	170	165
26	154	169	199	195	205	167	164	203	183	155	211	162
27	199	190	195	199	204	158	147	187	181	189	182	175
28	192	195	196	193	203	168	166	169	200	188	171	203
29	181		208	215	193	177	131	190	200	175	163	192
30	164		208	196	184	177	103	194	181	175	169	211
31	164		199		195		103	179		155		206
Sum	5,476	5,384	6,072	5,840	6,049	5,287	5,140	5,134	5,350	5,667	5,513	5,643

Month	Extreme Gage Feet		Ø Extreme Second-Feet				Average Second-Feet	Total Acre-Feet	Period 1935-1989 Acre-Feet		
			High		Low						
	High	Low	Day		Day				Average	Maximum	Minimum
			Current Year 1989								
Jan.			23	208	2	146	177	10,862	9,454	12,131	* 2,123
Feb.			16	220	21	145	192	10,672	9,313	12,970	* 2,023
Mar.			5	230	7	162	196	12,046	10,518	13,704	* 2,322
Apr.			29	215	2	171	195	11,581	10,306	12,982	2,117
May			15	214	4	172	195	12,000	10,856	13,900	2,473
June			23	208	13	157	176	10,483	10,025	12,570	2,525
July			21	188	!30	103	166	10,192	10,026	12,420	2,927
Aug.			26	203	1	113	166	10,184	9,951	12,657	2,989
Sept.			10	214	17	129	178	10,612	10,006	12,450	2,602
Oct.			12	210	!26	155	183	11,231	10,804	13,898	3,444
Nov.			5	222	! 8	163	184	10,924	10,077	12,712	3,407
Dec.			17	215	6	145	182	11,194	10,091	12,050	2,888
Yearly				230		103	182	131,981	121,427	149,010	31,840
	Meters		Cubic Meters per Second					Thousands of Cubic Meters			
				6.51		2.92	5.15	162,796	149,778	183,801	39,274

Ø Mean daily ! And other days * Partly estimated

09-5222.00 COLORADO RIVER AT SOUTHERLY INTERNATIONAL BOUNDARY - DISCHARGES

DESCRIPTION: Water-stage recorder was located in Mexico on the right bank of the river about 1,000 feet (305 m) upstream from the southerly international boundary, 2 miles (3.2 km) west of San Luis, Arizona, and 21.9 miles (35.2 km) downstream from Morelos Dam. The zero of the gage was at mean sea level, U. S. C. & G. S. datum. This gage was destroyed on January 19, 1983. Between January 19, 1983 and December 10, 1985, temporary gages were installed on the United States side and levels were established to ensure continuous record. On December 10, 1985 a permanent water-stage recorder was relocated on the left bank of the river about 80 feet (24.4 m) upstream from the southerly international boundary.

RECORDS: Records obtained and furnished by the United States Section of the Commission. Computations by shifting control methods. Records available: Daily discharges, January 1950 through 1989; continuous record of gage heights, January 1947 through 1989. Monthly flows for this station have been derived for the period January 1935 through 1949 based on the computed records of monthly flows of the Colorado River at the northerly international boundary combined with the measured monthly flows from the wasteways discharging into the boundary section of the river from the Yuma Project in Arizona.

REMARKS: Reservoirs, diversions in the United States and Mexico, drainage returns, and waste flows modify the river flow at this station.

EXTREMES: Since January 1950: Maximum instantaneous discharge, 33,100 second-feet (937 m3/sec) on August 19, 1983; maximum gage height, 84.84 feet (25.86 m) on November 29, 1957. Minimum discharge, no flow on several occasions since September 1, 1956.

Mean Daily Discharge in Second-Feet 1989 —— Annual and Period Summary

Day	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	" 18.9	* 2.1	" 0.3	0	0	0	0	" 68.7	0	0	0	0
2	* 25.9	" 2.0	" .3	0	0	0	0	" 3.9	0	0	0	0
3	* 51.6	" 1.9	" .3	0	0	0	0	0	0	0	0	0
4	* 86.3	" 1.8	" 0	0	0	0	0	0	0	0	0	0
5	2,570	" 1.7	" 0	0	0	0	0	0	0	0	0	0
6	2,620	" 1.7	" 15.4	0	0	0	0	0	0	0	0	0
7	1,260	" 1.6	" 9.5	0	0	0	0	0	0	0	0	0
8	* 362	" 1.6	" .5	0	0	0	0	0	0	0	0	0
9	" 83.9	" 1.5	0	0	0	0	0	0	0	0	0	0
10	* 66.9	" 1.5	0	0	0	0	0	" 218	0	0	0	0
11	" 52.5	" 1.5	0	0	0	0	0	1,670	0	0	0	0
12	* 506	" .7	0	0	0	0	0	*1,010	0	0	0	0
13	* 123	" 3.8	0	0	0	0	0	" 270	0	0	0	0
14	" 46.7	" 6.4	0	0	0	0	0	" 40.7	0	0	0	0
15	" 34.8	" 6.4	0	0	0	0	0	" 76.0	0	0	0	0
16	" 28.5	" 6.2	0	0	0	0	0	" 331	0	0	0	0
17	* 25.3	* 21.4	0	0	0	0	0	" 40.5	0	0	0	0
18	" 22.4	" 15.8	0	0	0	0	0	" 8.8	0	0	0	0
19	" 20.4	" 13.9	0	0	0	0	0	" 0	0	0	0	0
20	" 18.6	" 14.5	0	0	0	0	0	0	0	0	0	0
21	" 16.9	* 14.8	0	0	0	0	0	0	0	0	0	0
22	" 17.1	" 9.9	0	0	0	0	0	0	0	0	0	0
23	" 36.8	" 3.5	0	0	0	0	0	0	0	0	0	0
24	* 41.8	" 1.6	0	0	0	0	0	0	0	0	0	0
25	" 16.0	" 1.5	0	0	0	0	0	0	0	0	0	0
26	" 13.1	" 1.5	0	0	0	0	0	0	0	0	0	0
27	" 10.5	" 1.5	0	0	0	0	0	0	0	0	0	0
28	" 11.1	" .9	0	0	0	0	" 30.4	0	0	0	0	0
29	" 7.7		0	0	0	0	*1,230	0	0	0	0	0
30	" 5.8		0	0	0	0	" 570	0	0	0	0	0
31	" 4.0		0		0		" 240	0		0		0
Sum	8,204.5	143.2	26.3	0	0	0	2,070.4	3,737.6	0	0	0	0

Month	Current Year 1989 Extreme Gage Feet High	Extreme Gage Feet Low	Extreme Second-Feet High Day	Extreme Second-Feet High	Extreme Second-Feet Low Day	Extreme Second-Feet Low	Average Second-Feet	Total Acre-Feet	Period 1935-1989 Acre-Feet Average	Maximum	Minimum
Jan.	75.65	70.65	! 5	2,930	31	4.0	265	16,273	377,862	1,672,000	0
Feb.	72.36	71.00	17	44.1	!12	.3	5.1	284	304,340	1,385,000	0
Mar.	71.75	70.95	6	21.2	! 4	0	.8	52.2	243,514	1,127,000	52.2
Apr.	70.95	70.95		0		0	0	0	161,548	758,202	0
May	70.95	70.95		0		0	0	0	228,339	1,160,000	0
June	70.95	70.95		0		0	0	0	199,484	1,180,000	0
July	74.68	70.95	29	1,670	! 1	0	66.8	4,107	173,264	1,477,091	0
Aug.	75.01	70.98	11	1,840	! 2	0	121	7,413	186,468	1,705,190	0
Sept.	70.98	70.98		0		0	0	0	208,118	1,586,380	0
Oct.	70.98	70.98		0		0	0	0	247,162	1,738,909	0
Nov.	70.98	70.98		0		0	0	0	287,133	1,428,000	0
Dec.	70.98	70.98		0		0	0	0	351,798	1,839,000	0
Yearly	75.65	70.65		2,930		0	38.9	28,129	2,969,030	12,692,946	9,570
	Meters 23.06	21.53		Cubic Meters per Second 83.0		0	1.10	Thousands of Cubic Meters 34,697	3,662,239	15,656,495	11,804

! And other days " Estimated * Partly estimated

09-5222.01 COLORADO RIVER AT SOUTHERLY INTERNATIONAL BOUNDARY - STAGES

(See Preceding Page for Description)

MEAN DAILY GAGE HEIGHT IN FEET 1989

Day	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	" 71.42	# 71.34	" 71.00	70.95	70.95	70.95	70.95	" 71.66	70.98	70.98	70.98	70.98
2	# 71.42	" 71.33	" 71.00	70.95	70.95	70.95	70.95	" 71.33	70.98	70.98	70.98	70.98
3	# 71.48	" 71.33	" 71.00	70.95	70.95	70.95	70.95	71.23	70.98	70.98	70.98	70.98
4	# 71.28	" 71.32	" 70.98	70.95	70.95	70.95	70.95	71.23	70.98	70.98	70.98	70.98
5	75.31	" 71.31	" 70.98	70.95	70.95	70.95	70.95	71.23	70.98	70.98	70.98	70.98
6	75.38	" 71.30	" 71.57	70.95	70.95	70.95	70.95	71.23	70.98	70.98	70.98	70.98
7	73.99	" 71.30	" 71.37	70.95	70.95	70.95	70.95	71.23	70.98	70.98	70.98	70.98
8	# 72.82	" 71.30	" 70.99	70.95	70.95	70.95	70.95	71.23	70.98	70.98	70.98	70.98
9	" 71.80	" 71.29	" 70.95	70.95	70.95	70.95	70.95	71.23	70.98	70.98	70.98	70.98
10	# 71.64	" 71.29	70.95	70.95	70.95	70.95	70.95	" 71.99	70.98	70.98	70.98	70.98
11	" 71.47	" 71.29	70.95	70.95	70.95	70.95	70.95	74.77	70.98	70.98	70.98	70.98
12	# 72.85	" 71.28	70.95	70.95	70.95	70.95	70.95	# 73.72	70.98	70.98	70.98	70.98
13	# 72.21	" 71.41	70.95	70.95	70.95	70.95	70.95	" 72.16	70.98	70.98	70.98	70.98
14	" 71.74	" 71.52	70.95	70.95	70.95	70.95	70.95	" 71.41	70.98	70.98	70.98	70.98
15	" 71.60	" 71.52	70.95	70.95	70.95	70.95	70.95	" 71.48	70.98	70.98	70.98	70.98
16	" 71.50	" 71.51	70.95	70.95	70.95	70.95	70.95	" 72.33	70.98	70.98	70.98	70.98
17	# 71.45	# 71.91	70.95	70.95	70.95	70.95	70.95	" 71.47	70.98	70.98	70.98	70.98
18	" 71.39	" 71.80	70.95	70.95	70.95	70.95	70.95	" 71.20	70.98	70.98	70.98	70.98
19	" 71.33	" 71.70	70.95	70.95	70.95	70.95	70.95	" 71.00	70.98	70.98	70.98	70.98
20	" 71.28	" 71.65	70.95	70.95	70.95	70.95	70.95	70.98	70.98	70.98	70.98	70.98
21	" 71.24	# 71.59	70.95	70.95	70.95	70.95	70.95	70.98	70.98	70.98	70.98	70.98
22	" 71.23	" 71.40	70.95	70.95	70.95	70.95	70.95	70.98	70.98	70.98	70.98	70.98
23	" 71.53	" 71.11	70.95	70.95	70.95	70.95	70.95	70.98	70.98	70.98	70.98	70.98
24	# 71.61	" 71.01	70.95	70.95	70.95	70.95	70.95	70.98	70.98	70.98	70.98	70.98
25	" 71.27	" 71.01	70.95	70.95	70.95	70.95	70.95	70.98	70.98	70.98	70.98	70.98
26	" 71.27	" 71.01	70.95	70.95	70.95	70.95	70.95	70.98	70.98	70.98	70.98	70.98
27	" 71.26	" 71.01	70.95	70.95	70.95	70.95	70.95	70.98	70.98	70.98	70.98	70.98
28	" 71.38	" 71.01	70.95	70.95	70.95	70.95	" 71.48	70.98	70.98	70.98	70.98	70.98
29	" 71.33		70.95	70.95	70.95	70.95	# 74.21	70.98	70.98	70.98	70.98	70.98
30	" 71.33		70.95	70.95	70.95	70.95	" 73.08	70.98	70.98	70.98	70.98	70.98
31	" 71.34		70.95		70.95		" 72.16	70.98		70.98		70.98
Avg.	71.88	71.35	70.99	70.95	70.95	70.95	71.18	71.45	70.98	70.98	70.98	70.98

Partly Estimated "Estimated

09-5333.00 WELLTON-MOHAWK BYPASS DRAIN AT SOUTHERLY INTERNATIONAL BOUNDARY

DESCRIPTION: Water-stage recorder and Parshall flume located 80 feet (24.4 m) upstream from the southerly land boundary, 550 feet (168 m) east of the Colorado River, and 1.8 miles (2.9 km) west of San Luis, Arizona. The zero of the gage has not been determined.
RECORDS: Based on current meter measurements and a continuous record of gage heights. Station is operated by United States Section of the Commission. Records available: June 23, 1977 through 1989.
REMARKS: Pursuant to Minute No. 242 of the Commission, a bypass drain of the Wellton-Mohawk extension channel was constructed from Morelos Dam to the Santa Clara Slough in Mexico along the left bank of the Colorado River.

Mean Daily Discharge in Second-Feet 1989 —— Annual and Period Summary

Day	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	209	235	202	177	180	160	171	122	223	231	210	230
2	204	236	205	172	182	165	170	142	217	221	208	226
3	201	234	210	184	177	164	170	150	216	236	210	218
4	212	221	194	178	176	161	175	158	220	236	224	218
5	202	216	173	155	177	160	177	170	197	238	225	214
6	202 #	211	170	169	178	164	169	172	207	241	223	215
7	206	208	172	172	181	168	169	173	210	236	227	211
8	204	201	178	174	181	169	169	168	214	232	227	195 #
9	204	208	181	176	183	168	167	178	222	223	230	214
10	211	205	183	171	177	166	164	206	220	224	229	215
11	215	200	174	166	166	166	162	179	225	224	228	215
12	206	180	167	169	163	168	152	193	227	221	230	210
13	204	164	167	168	163	161	158	197	235	214	230	214
14	207	191	168	165	169	157	160	193	229	217	227	208
15	210	203	170	165	175	152	165	169	229	213	228	207
16	211	198	170	164	176	155	166	184 #	234	208	226 #	209
17	210	202	172	156	212	76.7	161	188 #	229	206	231	209
18	215	213	174	157	196	26.6	166	186	225	209 #	225	210
19	227	219	171	152 #	170	9.9	163	190	226	215	235	210
20	234	215	177	156	168	3.0	169	190	223	219	240	213
21	235	214 #	173	159	167	1.6	173 #	193	232	217	235	215
22	235	222	177	157	167	5.3	174	196	236 #	212	240	213
23	240	220	177 #	163	160	25.2	182	194	231	210	235	218
24	238	218	174	165	159 #	98.9	186	197	226	205	238	213
25	240	217	177	166	161	117	189	198	226	208	236	216
26	249	206	181	167	162	127 #	189	193	223	210	234	213
27	249	207	180	170	166	142	190	188	216	214	232	214
28	245	208	178	179	164	156	199	188	206	216	226	213
29	240		168	177	164	158	60.3	189	218	214	222	205
30	237		164	179	165	172	68.4	183	218	208	225	206
31	230		176		164		84.6	219		209		209
Sum	6,832	5,872	5,503	5,028	5,349	3,723.2	5,018.3	5,646	6,660	6,787	6,836	6,596

Month	Current Year 1989 Extreme Gage Feet High	Extreme Gage Feet Low	Extreme Second-Feet High Day	Extreme Second-Feet High	Extreme Second-Feet Low Day	Extreme Second-Feet Low	Average Second-Feet	Total Acre-Feet	Period 1977-1989 Acre-Feet Average	Maximum	Minimum
Jan.	2.14	1.82	26	257	! 2	197	220	13,551	12,236	17,542	6,009
Feb.	2.07	1.66	! 1	243	!13	162	210	11,647	11,303	14,896	6,896
Mar.	1.97	1.55	3	215	!29	156	178	10,915	12,690	17,427	9,258
Apr.	1.80	1.48	!29	183	! 4	142	168	9,973	11,816	16,711	2,793
May	2.02	1.60	17	224	23	153	173	10,610	12,439	16,808	4,228
June	1.74	.08	12	176	!21	1.1	124	7,385	11,748	16,086	7,385
July	2.12	.80	28	237	!29	42.5	162	9,954	12,464	18,026	8,333
Aug.	2.36	1.14	10	295	1	80.7	182	11,199	12,790	18,196	8,656
Sept.	2.08	1.62	!24	245	5	162	222	13,210	11,568	19,083	41.7
Oct.	2.13	1.89	! 2	249	29	195	219	13,462	12,088	19,133	19.4
Nov.	2.17	1.94	22	253	2	208	228	13,559	11,373	16,980	48.0
Dec.	2.07	1.86	1	232	8	185	213	13,083	12,069	18,256	6,216
Yearly	2.36	0.08		295		1.1	191	138,548	144,584	180,374	97,641
	Meters			Cubic Meters per Second				Thousands of Cubic Meters			
	0.72	0.02		8.35		0.03	5.41	170,896	178,341	222,488	120,438

Discharge measurement made on this day ! And other days

09-5350.00 WASTEWAY TO COLORADO RIVER AT KILOMETER 27 IN MEXICO

DESCRIPTION: Water-stage recorder and cableway located on the left bank of the canal wasteway immediately upstream from where it discharges into the Colorado River, 0.6 mile (1.0 km) downstream from the wasteway gates on the Central Feeder Canal on the right bank of the Colorado River, 16.8 miles (27.0 km) downstream from Morelos Dam, and 820 feet (250 m) south of the junction of the Mexicali-San Luis and Algodones-Pescaderos highways.

RECORDS: Data obtained and computed by the Colorado River Irrigation District of the Ministry of Agriculture and Hydraulic Resources and furnished by the Mexican Section of the Commission. Records shown in table below are waste returns to the Colorado River. Records available: April 1956 through 1989.

REMARKS: The Colorado River Irrigation District transports water for irrigation of land on the left bank of the Colorado River by the Central Feeder Canal to a point called Kilometer 27. At this point, flows may be returned to the river through the wasteway or diverted to the Bacanora-Monumentos Canal system through the Sanchez Mejorada Siphon, which was placed in operation on June 28, 1963. As part of the rehabilitation works, started in 1968, of the Colorado River Irrigation District, the Canal de Conexion was enlarged and lined, and is now known as the Central Feeder Canal.

MONTHLY DISCHARGE IN ACRE-FEET

Month	Current Year 1989	Period 1956-1989		
		Average	Maximum	Minimum
January	1,075	10,082	69,527	0
February	26.6	4,748	41,264	0
March	50.4	7,142	58,411	0
April	0	12,371	69,212	0
May	0	11,600	80,727	0
June	0	9,917	50,025	0
July	53.9	11,403	46,139	0
August	314	15,394	107,162	0
September	125	12,654	68,053	0
October	0	11,536	110,417	0
November	0	10,815	99,044	0
December	3.5	9,673	70,213	0
Yearly	1,648	130,527	509,407	0
	Thousands of Cubic Meters			
	2,033	161,003	628,347	0

09-5365.00 WASTEWAY TO COLORADO RIVER AT KILOMETER 38 IN MEXICO

DESCRIPTION: Wasteway to the Colorado River on the left bank of new Barrote Canal at old dam and bridge at Kilometer 18+251 (old Kilometer 38+000). The wasteway is located in the Colonia Bojorquez 0.8 mile (1.3 km) upstream from the Sonora-Baja California railroad bridge, 3.7 miles (5.9 km) downstream from the Miguel C. Rodriguez gaging station, and 28.1 miles (45.3 km) downstream from the southerly international boundary.
RECORDS: The records are computed by the Ministry of Agriculture and Hydraulic Resources and based upon gate openings. Records available: January 1964 through 1989.
REMARKS: The wasteway structure on the left bank of the Colorado River has two manually operated radial gates 9.8 feet (3.0 m) wide. It discharges into a dirt canal 656 feet (200 m) long with a total capacity of 459 second-feet (13.0 m3/sec) which discharges to the river.

MONTHLY DISCHARGE IN ACRE-FEET

Month	Current Year 1989	Period 1964-1989		
		Average	Maximum	Minimum
January	0	1,730	8,546	0
February	0	1,364	9,757	0
March	0	713	4,809	0
April	0	380	4,503	0
May	0	1,407	11,549	0
June	0	811	6,960	0
July	0	679	7,389	0
August	0	1,103	14,402	0
September	0	2,143	13,665	0
October	0	4,399	23,242	0
November	0	2,740	20,481	0
December	0	2,271	10,847	0
Yearly	0	19,741	83,688	0
	Thousands of Cubic Meters			
	0	24,350	103,228	0

STORED WATER IN LARGE RESERVOIRS OF THE COLORADO RIVER

Data are presented below for all large storage reservoirs in the Colorado River basin below Lee's Ferry, all of which are located in the United States. The monthly figures represent usable contents on the last day of the month, in thousands of acre-feet. The capacities indicated are usable capacities at the top of the spillway gates in closed position for those dams having controlled spillways; for all others, capacities indicated are at spillway level. Records furnished by the U.S. Geological Survey.

IN THOUSANDS OF ACRE-FEET

Month	LAKE MEAD (Capacity 26,159.0)		LAKE MOHAVE (Capacity 1,810.0)		HAVASU LAKE (Capacity 619.4)		TOTAL IN UNITED STATES RESERVOIRS (Capacity 28,588.4)	
	1989	Average 1935-1989	1989	Average 1951-1989	1989	Average 1939-1989	1989	Estimated Average
Jan.	23,120	18,348	1,716	1,661	541.8	553.4	25,377.8	20,562.4
Feb.	23,279	18,181	1,694	1,677	536.9	555.3	25,509.9	20,413.3
Mar.	22,957	17,929	1,650	1,676	563.7	569.5	25,170.7	20,174.5
Apr.	22,534	17,984	1,554	1,669	594.0	599.9	24,682.0	20,252.9
May	21,859	18,696	1,762	1,729	604.0	602.9	24,225.0	21,027.9
June	21,553	19,743	1,774	1,637	603.0	600.9	23,930.0	21,980.9
July	21,458	19,895	1,586	1,512	586.8	589.9	23,630.8	21,996.9
Aug.	21,414	19,706	1,488	1,463	573.9	574.2	23,475.9	21,743.2
Sept.	21,528	19,487	1,388	1,433	563.3	569.6	23,479.3	21,489.6
Oct.	21,435	19,273	1,409	1,444	553.5	568.4	23,397.5	21,285.4
Nov.	21,361	19,113	1,555	1,515	540.9	558.9	24,456.9	21,186.9
Dec.	21,469	18,935	1,636	1,595	544.9	557.2	23,649.9	21,087.2
Avg.	21,997	18,941	1,601	1,584	567.2	575.0	24,165.2	21,100.0
Max.	23,279	! 27,780	1,774	! 1,808	604.0	! 688.7	25,509.9	! 29,132.3
Min.	21,361	* 10,727	1,388	!! 1,186	536.9	!! 76.9	23,397.5	!! 13,062.6

! Maximum end of month storage for period of record
!! Minimum end of month storage for period of record
* Minimum end of month storage since 1940

SUSPENDED SILT - 1989

The following tables are based on determinations of gravimetric percentages of dry silt in water samples taken at each station by one of the following methods.

A. By lowering a D-43 depth integrating sampler at verticals located at centers of sections of equal discharge in the river cross section, being careful to approach but not strike the bottom. The samples obtained in the section are combined to comprise a composite sample for that date.

B. By lowering a D-43 depth integrating sampler at verticals located at centers of each span of the service bridge across the Alamo Canal, being careful to approach but not strike the bottom. The samples obtained in the section are combined to comprise a composite sample for that date.

C. By sampling at the stream surface with a separate bottle at each of three points, spaced 1/6, 1/2, and 5/6 of the stream width. The gravimetric percentage in each sample is determined, a coefficient of 1.10 is applied to the average of the three, and the product applied to the volume of the stream flow represented by that set of samples.

COLORADO RIVER AT NORTHERLY INTERNATIONAL BOUNDARY

Date	Time Std.	Stream-flow, Momen-tary Sec.-Ft.	Gravimetric Percent	Date	Time Std.	Stream-flow, Momen-tary Sec.-Ft.	Gravimetric Percent	Date	Time Std.	Stream-flow, Momen-tary Sec.-Ft.	Gravimetric Percent
Jan.11	0850	2,140	0.0037	May 18	0820	1,380	0.0031	Sep. 6	0753	1,570	0.0087
19	0825	1,190	0.0018	25	0815	1,850	0.0037	13	0742	1,400	0.0117
25	1007	1,230	0.0019	31	0755	1,960	0.0028	20	0815	1,670	0.0101
Feb. 9	0950	1,480	0.0125	June 8	0740	1,420	0.0032	27	0744	2,010	0.0248
16	0815	1,560	0.0053	14	0914	1,640	0.0025	Oct. 4	0810	996	0.0059
23	0835	2,250	0.0045	21	0735	2,130	0.0021	11	0753	952	0.0058
Mar. 2	0831	2,380	0.0052	27	0810	1,990	0.0016	18	0730	853	0.0065
9	1008	2,600	0.0062	July 5	0755	2,520	0.0049	25	0740	908	0.0076
16	0822	1,400	0.0063	12	0750	2,530	0.0047	Nov. 1	0752	979	0.0044
23	0945	2,660	0.0056	19	0805	2,700	0.0108	8	0800	955	0.0039
30	0753	2,730	0.0052	26	0740	2,720	0.0045	15	0748	987	0.0053
Apr. 6	0755	3,630	0.0041	Aug. 2	0744	2,870	0.0064	22	0750	970	0.0061
13	0800	3,860	0.0045	9	0725	2,800	0.0069	29	0810	1,020	0.0037
20	0750	3,810	0.0030	16	0750	3,220	0.0078	Dec. 6	0807	1,290	0.0038
27	0807	2,820	0.0030	23	0735	2,580	0.1008	13	0810	1,310	0.0016
May 3	0800	3,590	0.0035	30	0733	1,850	0.0049	21	0803	1,590	0.0035
11	0805	2,150	0.0028					27	0800	1,340	0.0022

Samples by U. S. Section and analyses by United States Bureau of Reclamation, Method A

INTAKE CANAL AT MORELOS DIVERSION STRUCTURE

Month	Tons		Number of Samples	Gravimetric Percentages			Acre-Feet at 1,847 Tons/Ac.Ft.	1952-1989 Period of Record		
	Water	Silt		Average	Maximum Sample	Minimum Sample		Average	Maximum	Minimum
Jan.	127,090,700	3,629	4	0.0029	0.0058	0.0016	2.0	8.8	50.8	0.2
Feb.	130,469,800	2,869	4	.0023	.0034	.0012	1.5	9.4	59.8	.9
Mar.	224,242,400	4,984	5	.0022	.0030	.0011	2.7	39.2	154	2.7
Apr.	279,110,900	9,256	4	.0033	.0061	.0016	5.0	38.9	236.6	5.0
May	173,630,000	4,289	5	.0025	.0046	.0009	2.3	11.8	61.8	1.5
June	137,894,500	3,803	4	.0028	.0033	.0023	2.1	25.9	108.6	2.1
July	220,454,500	7,918	4	.0036	.0046	.0032	4.3	35.9	155.9	3.9
Aug.	232,238,900	14,754	5	.0063	.0201	.0021	8.0	34.5	135.3	3.8
Sept.	124,863,000	10,541	4	.0084	.0229	.0018	5.7	15.3	64.7	1.9
Oct.	84,730,500	2,513	4	.0030	.0056	.0018	1.4	5.2	48.2	.3
Nov.	80,065,600	2,455	5	.0031	.0041	.0014	1.3	4.8	54.9	.2
Dec.	116,809,200	3,571	4	.0031	.0052	.0016	1.9	7.1	23.7	1.1
Yearly	1,931,600,000	70,583	52	0.0036	0.0229	0.0009	38.1	236.8	809.0	38.1

Samples and analyses by Mexican Section, Method B

COLORADO RIVER AT SOUTHERLY INTERNATIONAL BOUNDARY

Date	Time Std.	Stream-flow, Momen-tary Sec.-Ft.	Gravimetric Percent	Date	Time Std.	Stream-flow, Momen-tary Sec.-Ft.	Gravimetric Percent	Date	Time Std.	Stream-flow, Momen-tary Sec.-Ft.	Gravimetric Percent
Aug 11	1255	1,840	0.0482								

Samples by U. S. Section and analyses by United States Bureau of Reclamation, Method A

CHEMICAL ANALYSES OF WATER SAMPLES

1989

The tables below are based on chemical analyses of samples from the Colorado River at the Northerly International Boundary taken by the United States Section of the Commission and analyzed under a contract with the U. S. Bureau of Reclamation.

COLORADO RIVER AT NORTHERLY INTERNATIONAL BOUNDARY

1989 Date	Time Std.	Streamflow Momentary Sec.-Ft.	Specific Conductance Micromhos	pH Units	Hardness, Total (as CaCO3) mg/L	Hardness Noncarbonate (as CaCO3) mg/L	Calcium ion (Ca), Dissolved mg/L	Magnesium ion (Mg) Dissolved mg/L
Jan. 3	0830	1,630	1,460	8.2	374	199	90.9	35.9
17	0745	1,440	1,580	8.2	406	214	104.0	35.7
Feb. 6	0900	1,350	1,480	8.3	435	259	102.0	44.1
21	0845	2,170	1,260	8.3	379	222	90.4	37.4
Mar. 6	0845	2,600	1,240	8.2	324	168	79.8	30.5
20	0800	2,600	1,230	8.3	320	165	77.0	31.2
Apr. 3	0730	3,650	1,160	8.3	320	172	78.5	30.3
17	0800	3,770	1,160	8.3	322	176	80.8	29.3
May 1	0800	2,970	1,200	8.3	346	197	89.0	30.3
15	0800	1,320	1,440	8.3	372	205	93.1	34.1
June 5	0730	1,870	1,350	8.3	352	194	90.1	31.0
19	0800	1,980	1,300	8.3	354	199	89.5	31.8
2	0800	2,010	1,280	8.4	351	198	94.0	28.4
July 3	0800	2,550	1,250	8.3	343	192	89.6	29.1
17	0800	2,710	1,200	8.4	322	175	80.4	29.7
Aug. 7	0745	2,790	1,190	8.4	319	168	81.8	28.1
21	0730	2,790	1,230	8.4	319	168	81.6	28.1
Sep. 5	0800	1,810	1,340	8.3	324	164	84.4	27.6
18	0800	1,350	1,400	8.4	320	162	84.3	26.8
Oct. 2	0830	1,160	1,370	8.3	329	171	85.4	28.4
16	0800	876	1,560	8.2	363	190	91.6	32.7
Nov. 6	0800	979	1,600	8.3	435	259	110.0	39.2
20	0800	963	1,610	8.2	392	214	96.5	36.8
Dec. 4	0830	1,000	1,580	8.3	409	234	108.0	34.0
18	0730	1,340	1,420	8.2	388	225	101.0	33.1

1989 Date	Sodium ion (Na) Dissolved mg/L	Potassium ion (K) Dissolved mg/L	Sulfate ion (SO4) Dissolved mg/L	Chloride ion (Cl) Dissolved mg/L	Carbonate (as CO3) mg/L	Bicarbonate (as HCO3) mg/L	Nitrate (as NO3) mg/L	Solids Dissolved (Calculated) mg/L
Jan. 3	167	4.0	330	165	0	214	1.9	916
17	181	3.7	373	189	0	234	1.6	1019
Feb. 6	164	4.2	336	177	0	215	1.6	950
21	131	4.0	305	131	0	191.5	2.2	810
Mar. 6	134	3.2	293	126	0	190.3	1.0	777
20	136	3.7	295	123	0	189.1	1.3	774
Apr. 3	123	3.6	282	114	0	180.6	1.5	734
17	123	4.1	278	113	0	178.1	1.2	730
May 1	121	4.0	291	118	0	181.8	1.4	757
15	157	4.2	332	151	0	203.7	1.3	889
June 5	144	4.4	307	142	.6	192.8	.9	829
19	141	4.1	305	133	0	189.1	0	812
2	139	4.1	317	130	1.7	186.9	.9	822
July 3	135	4.1	295	125	0	184.2	1.0	782
17	127	3.7	284	109	1.1	179.6	1.0	737
Aug. 7	127	4.0	295	120	0	184.2	.9	760
21	127	4.4	289	124	.7	184	1.0	758
Sep. 5	159	4.7	325	141	0	195.2	1.1	853
18	153	3.8	319	142	1.2	192.8	.9	839
Oct. 2	138	3.2	300	137	0	192.8	1.1	800
16	164	4.8	347	178	0	211.1	1.2	938
Nov. 6	175	4.6	356	191	0	214.7	1.5	999
20	192	4.1	352	187	0	217.2	1.7	991
Dec. 4	164	4.3	356	189	0	213.5	1.6	977
Dec. 18	154	4.0	328	153	0	198.9	1.7	886

SPECIFIC CONDUCTANCE OF WATER SAMPLES

The following tables show specific conductance of individual water samples taken at Colorado River stations and in Mexican canals. Samples were taken at the northerly international boundary by both Sections of the Commission and at the southerly international boundary by the United States Section. Determinations for the northerly international boundary were made by the Bureau of Reclamation and the United States Section of the Commission (jointly); and for the southerly international boundary, by the United States Section of the Commission. Samples for the Intake Canal at Morelos Dam were taken by the Mexican Section of the Commission, and determinations were made by the Ministry of Agriculture and Hydraulic Resources of Mexico. No samples were taken at the Miguel C. Rodriguez gaging station.

COLORADO RIVER AT NORTHERLY INTERNATIONAL BOUNDARY

SPECIFIC CONDUCTANCE OF WATER SAMPLES IN MICROMHOS/CM @ 25 DEG C - 1989

Day	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	*1,430	1,400	1,220	*1,180	1,200	1,260	*1,230	1,200	1,410	*1,350	1,550	1,520
2	*1,440	1,360	1,270	*1,170	1,170	1,330	*1,240	1,170	*1,400	1,370	1,570	*1,540
3	1,460	1,360	1,240	1,160	1,140	*1,330	1,250	1,180	*1,380	1,300	1,650	*1,550
4	1,350	*1,400	*1,240	1,110	1,130	*1,330	*1,250	1,190	*1,360	1,460	*1,630	1,580
5	1,160	*1,440	*1,240	1,070	1,150	1,350	1,250	*1,190	1,340	1,330	*1,620	1,520
6	1,170	1,480	1,240	1,060	*1,160	1,330	1,200	*1,190	1,350	1,480	1,600	1,460
7	*1,290	1,480	1,220	1,100	*1,170	1,280	1,220	1,190	1,330	*1,450	1,450	1,490
8	*1,400	1,600	1,210	*1,110	1,180	1,320	*1,210	1,210	1,380	*1,420	1,520	1,470
9	1,520	1,370	1,150	*1,110	1,210	1,280	*1,210	1,180	*1,390	*1,380	1,430	*1,490
10	1,500	1,430	1,200	1,120	1,240	*1,280	1,200	1,180	*1,390	1,350	*1,470	*1,500
11	1,490	*1,400	*1,200	1,100	1,250	*1,290	1,180	1,030	1,400	1,470	*1,510	1,520
12	1,430	*1,370	*1,200	1,110	1,290	1,290	1,180	*1,130	1,390	1,370	*1,540	1,510
13	1,610	1,340	1,200	1,140	*1,330	1,290	1,170	*1,220	1,380	1,520	1,580	1,500
14	*1,600	1,350	1,130	1,130	*1,380	1,280	1,160	1,320	1,340	*1,530	1,580	1,460
15	*1,590	1,350	1,090	*1,140	1,440	1,250	*1,170	1,180	1,370	*1,530	1,540	1,440
16	*1,580	1,360	1,200	*1,150	1,450	1,270	*1,190	1,220	*1,380	1,560	1,540	*1,430
17	1,580	1,240	1,220	1,160	1,400	*1,270	1,200	1,280	*1,390	1,580	1,610	*1,430
18	1,600	*1,240	*1,220	1,100	1,390	*1,280	1,200	1,280	1,400	1,580	*1,610	1,420
19	1,590	*1,240	*1,230	1,130	1,390	1,300	1,190	*1,270	1,400	1,580	*1,610	1,470
20	1,590	*1,250	1,230	1,130	*1,380	1,260	1,180	*1,240	1,340	1,590	1,610	1,400
21	*1,560	1,260	1,160	1,110	*1,360	1,250	1,170	1,230	1,330	*1,590	1,660	1,380
22	*1,530	1,280	1,160	*1,120	1,350	1,210	*1,180	1,260	1,310	*1,590	1,630	1,370
23	1,500	1,260	1,150	*1,120	1,300	1,230	*1,200	1,280	*1,330	1,590	*1,600	*1,400
24	1,500	1,300	1,140	1,130	1,280	*1,250	1,210	1,270	*1,340	1,630	1,580	*1,430
25	1,520	*1,310	*1,140	1,150	1,270	*1,270	1,210	1,300	1,360	1,550	*1,540	*1,460
26	1,480	*1,310	*1,140	1,160	1,330	1,280	1,180	*1,290	1,350	1,600	*1,500	1,490
27	1,430	1,320	1,140	1,190	*1,330	1,300	1,180	*1,280	1,310	1,580	1,460	1,580
28	*1,380	1,510	1,130	1,180	*1,320	1,320	1,130	1,280	1,220	*1,590	1,570	1,550
29	*1,340		1,160	*1,180	*1,320	1,220	*1,120	1,280	1,360	*1,600	1,570	1,470
30	1,290		1,160	*1,180	1,320	1,230	*1,110	1,410	*1,360	1,610	1,530	*1,500
31	1,420		1,190		1,300		1,100	1,360		1,550		*1,520

* Estimated

SPECIFIC CONDUCTANCE OF WATER SAMPLES

INTAKE CANAL AT MORELOS DIVERSION STRUCTURE

SPECIFIC CONDUCTANCE OF WATER SAMPLES IN MICROMHOS/CM @ 25 DEG C - 1989

Day	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	1,370	1,390	1,280	1,240	1,240	1,280	1,280	1,200	1,420	1,410	1,560	1,540
2	1,360	1,390	1,320	1,240	1,230	1,370	1,280	1,210	1,470	1,400	1,570	1,550
3	1,370	1,370	1,280	1,240	1,230	1,350	1,280	1,230	1,470	1,310	1,570	1,590
4	1,370	1,380	1,210	1,190	1,210	1,330	1,280	1,220	1,320	1,480	1,580	1,400
5	1,240	1,410	1,320	1,150	1,210	1,310	1,280	1,270	1,320	1,320	1,590	1,480
6	1,230	1,410	1,290	1,200	1,240	1,300	1,250	1,290	1,390	1,490	1,650	1,480
7	1,230	1,490	1,200	1,200	1,220	1,300	1,280	1,300	1,320	1,500	1,510	1,490
8	1,440	1,510	1,260	1,220	1,240	1,300	1,250	1,290	1,390	1,500	1,520	1,480
9	1,520	1,400	1,250	1,210	1,290	1,300	1,260	1,250	1,360	1,500	1,420	1,480
10	1,520	1,390	1,040	1,230	1,220	1,300	1,280	1,220	1,360	1,390	1,570	1,540
11	1,520	1,300	1,190	1,170	1,260	1,300	1,240	1,050	1,390	1,490	1,550	1,540
12	1,430	1,370	1,250	1,170	1,400	1,300	1,190	1,190	1,400	1,500	1,560	1,550
13	1,590	1,290	1,250	1,200	1,300	1,300	1,210	1,350	1,400	1,500	1,590	1,520
14	1,610	1,340	1,240	1,230	1,390	1,300	1,280	1,290	1,370	1,700	1,550	1,450
15	1,600	1,350	1,120	1,250	1,420	1,230	1,280	1,170	1,390	1,690	1,560	1,460
16	1,580	1,390	1,290	1,220	1,420	1,230	1,280	1,210	1,410	1,700	1,560	1,460
17	1,530	1,300	1,290	1,220	1,410	1,210	1,280	1,310	1,420	1,690	1,610	1,460
18	1,610	1,250	1,290	1,190	1,270	1,220	1,250	1,320	1,410	1,690	1,600	1,450
19	1,560	1,230	1,290	1,200	1,320	1,230	1,240	1,310	1,410	1,610	1,610	1,450
20	1,560	1,310	1,280	1,190	1,340	1,200	1,220	1,260	1,360	1,650	1,620	1,450
21	1,510	1,320	1,200	1,190	1,440	1,200	1,210	1,310	1,320	1,650	1,620	1,400
22	1,500	1,170	1,220	1,190	1,360	1,280	1,210	1,280	1,310	1,650	1,670	1,500
23	1,490	1,320	1,240	1,190	1,320	1,250	1,240	1,310	1,380	1,650	1,620	1,500
24	1,490	1,380	1,220	1,160	1,290	1,290	1,230	1,290	1,380	1,650	1,590	1,500
25	1,500	1,310	1,200	1,190	1,260	1,320	1,250	1,300	1,350	1,560	1,610	1,600
26	1,400	1,350	1,200	1,200	1,210	1,320	1,220	1,280	1,340	1,620	1,610	1,600
27	1,410	1,360	1,220	1,220	1,240	1,340	1,190	1,290	1,330	1,570	1,600	1,600
28	1,310	1,290	1,180	1,250	1,220	1,330	1,190	1,280	1,280	1,580	1,590	1,580
29	1,340		1,180	1,260	1,310	1,290	1,150	1,400	1,300	1,580	1,590	1,490
30	1,300		1,180	1,260	1,300	1,280	1,140	1,400	1,350	1,580	1,550	1,500
31	1,320		1,240		1,300		1,200	1,410		1,580		1,600

COLORADO RIVER AT SOUTHERLY INTERNATIONAL BOUNDARY

SPECIFIC CONDUCTANCE OF WATER SAMPLES IN MICROMHOS/CM @ 25 DEG C - 1989

January		February		March		August					
3	1,420	6	1,780	7	1,440	11	993				
17	1,600	21	1,330			17	1,210				

RAINFALL ON THE COLORADO RIVER WATERSHED

IN INCHES

Tabulated below are monthly records of rainfall at stations located in California and Arizona in the United States and in Baja California and Sonora in Mexico, with averages for their periods of record. Records of daily rainfall amounts, where available, are on file in the offices of the United States or Mexican Sections of the Commission. For location, elevation, period of record, and the observer, see alphabetical listings of these stations on following page in this bulletin.

IN THE UNITED STATES

Month	Brawley, California		El Centro, California		Blythe, California		Yuma Citrus Station, Arizona		Bullhead City, Arizona	
	1989	Average 1931-1989	1989	Average 1931-1989	1989	Average 1931-1989	1989	Average 1931-1989	1989	Average 1978-1989
Jan.	0.84	0.35	0.72	0.38	1.16	0.45	0.91	0.40	1.07	1.06
Feb.	0	.33	0	.34	0	.42	0	.34	T	.72
Mar.	.01	.23	0	.21	.06	.39	.09	.25	.03	.94
Apr.	0	.09	0	.09	0	.13	0	.12	0	.28
May	0	.02	0	.01	0	.03	0	.02	.13	.14
June	0	.01	0	.01	0	.03	0	.02	T	.01
July	.03	.06	0	.09	.04	.19	3.51	.25	.17	.47
Aug.	0	.37	.17	.36	0	.78	1.97	.59	0	1.15
Sep.	0	.32	0	.28	0	.38	T	.34	T	.53
Oct.	0	.27	.03	.29	0	.29	T	.38	.22	.38
Nov.	0	.18	0	.18	T	.28	.05	.20	0	.65
Dec.	0	.42	0	.44	0	.53	T	.42	.10	.85
Yearly	0.88	2.65	0.92	2.68	1.26	3.90	6.53	3.33	1.72	7.18

IN MEXICO

Month	Los Algodones, Baja California		Mexicali, Baja California		Bataques, Baja California		San Luis, R. C., Sonora		Delta, Baja California	
	1989	Average 1948-1989	1989	Average 1926-1989	1989	Average 1948-1989	1989	Average 1949-1989	1989	Average 1948-1989
Jan.	0.67	0.39	0.59	0.35	0.83	0.35	0.87	0.31	0.35	0.35
Feb.	0	.24	0	.31	0	.20	0	.28	0	.28
Mar.	.08	.16	.08	.24	.12	.12	0	.24	0	.16
Apr.	0	.08	0	.08	0	.08	0	.04	0	.08
May	0	T	0	T	0	T	0	.04	0	T
June	0	T	0	T	0	.04	0	T	#	#
July	0	.12	.16	.16	0	.08	0	.20	#	#
Aug.	.94	.39	.16	.39	0	.24	0	.43	#	#
Sept.	0	.20	0	.35	0	.12	#	#	#	#
Oct.	0	.28	#	#	#	#	#	#	#	#
Nov.	0	.16	#	#	0	.12	0	.39	0	.12
Dec.	0	.35	#	#	0	.28	#	.63	0	.43
Yearly	1.69	2.40	#	#	#	#	#	#	#	#

Month	Colonia Juarez, Baja California		Laguna Salada, Baja California		Riito, Sonora		San Felipe, Baja California		El Centinela, Baja California	
	1989	Average 1952-1989	1989	Average 1975-1989	1989	Average 1959-1989	1989	Average 1969-1989	1989	Average 1978-1989
Jan.	0.91	0.47	#	#	0.08	0.28	0	0.31	0.16	0.24
Feb.	0	.28	#	#	0	.24	0	.16	0	.24
Mar.	0	.28	#	#	0	.16	0	.12	0	.20
Apr.	0	.08	#	#	#	#	0	.04	#	#
May.	0	.04	#	#	0	T	0	.04	#	#
June	0	T	#	#	0	.04	0	.04	#	#
July	.08	.20	0	.16	0	.08	0	.12	#	#
Aug	.39	.35	0	.55	T	.28	0	.43	#	#
Sept.	0	.28	0	.59	0	.43	0	.35	#	#
Oct.	#	.43	0	.24	0	.35	0	.20	#	#
Nov.	#	.24	0	.12	#	#	0	.20	#	#
Dec.	0	.43	0	.71	#	#	0	.43	#	#
Yearly	#	#	#	#	#	#	0	2.64	#	#

T Trace # Missing record

LOCATION OF RAINFALL STATIONS ON THE COLORADO RIVER WATERSHED

The precipitation records of the stations listed alphabetically below began on the date shown and extend through 1989.

IN THE UNITED STATES

NAME OF STATION	LATITUDE	LONGITUDE	ELEV. (FT.)	RECORD BEGAN	OBSERVER
* Blythe, California	33° 37'	114° 36'	268	1909	State Division of Forestry
Brawley, California	32° 57'	115° 33'	100	1908	Agricultural Research Service
Bullhead City, Arizona	35° 07'	114° 36'	580	1980	Bullhead City Fire Department
El Centro, California	32° 46'	115° 34'	30	1930	El Centro Water Department
Yuma Citrus Station, Arizona	32° 37'	114° 39'	191	1923	University of Arizona Experimental Farm

IN MEXICO

NAME OF STATION	LATITUDE	LONGITUDE	ELEV. (FT.)	RECORD BEGAN	OBSERVER
Bataques, Baja California	32° 34'	115° 00'	** 66	1948	# S. A. R. H.
Colonia Juarez, Baja California	32° 18'	115° 05'	49	1952	S. A. R. H.
Delta, Baja California	32° 21'	115° 11'	** 39	1948	S. A. R. H.
El Centinela, Baja California	32° 35'	115° 45'	164	1978	S. A. R. H.
Laguna Salada, Baja California	32° 12'	115° 44'	7	1975	S. A. R. H.
Los Algodones, Baja California	32° 42'	114° 44'	115	1948	S. A. R. H.
Mexicali, Baja California	32° 40'	115° 28'	13	1926	S. A. R. H.
Riito, Sonora	32° 13'	115° 01'	43	1959	S. A. R. H.
San Felipe, Baja California	31° 01'	114° 51'	72	1969	S. A. R. H.
San Luis, R. C., Sonora	32° 28'	114° 51'	131	1949	S. A. R. H.

* Not shown on map
± Elevation above mean sea level except Brawley and El Centro, which are elevations below mean sea level
** Elevations obtained from International Boundary and Water Commission topographic maps
# Ministry of Agriculture and Hydraulic Resources

EVAPORATION IN THE COLORADO RIVER BASIN

IN INCHES

Tabulated below are records of evaporation observed at one station in Arizona and at nine stations in Baja California and Sonora, Mexico. The station in the United States is operated by the University of Arizona Experimental Farm. The stations in Mexico are operated by the Ministry of Agriculture and Hydraulic Resources. The type of pan used at all these stations was the National Weather Service standard pan of 4-foot diameter. For specific location of these stations, refer to data opposite the same station name shown in "Location of Rainfall Stations," in this bulletin.

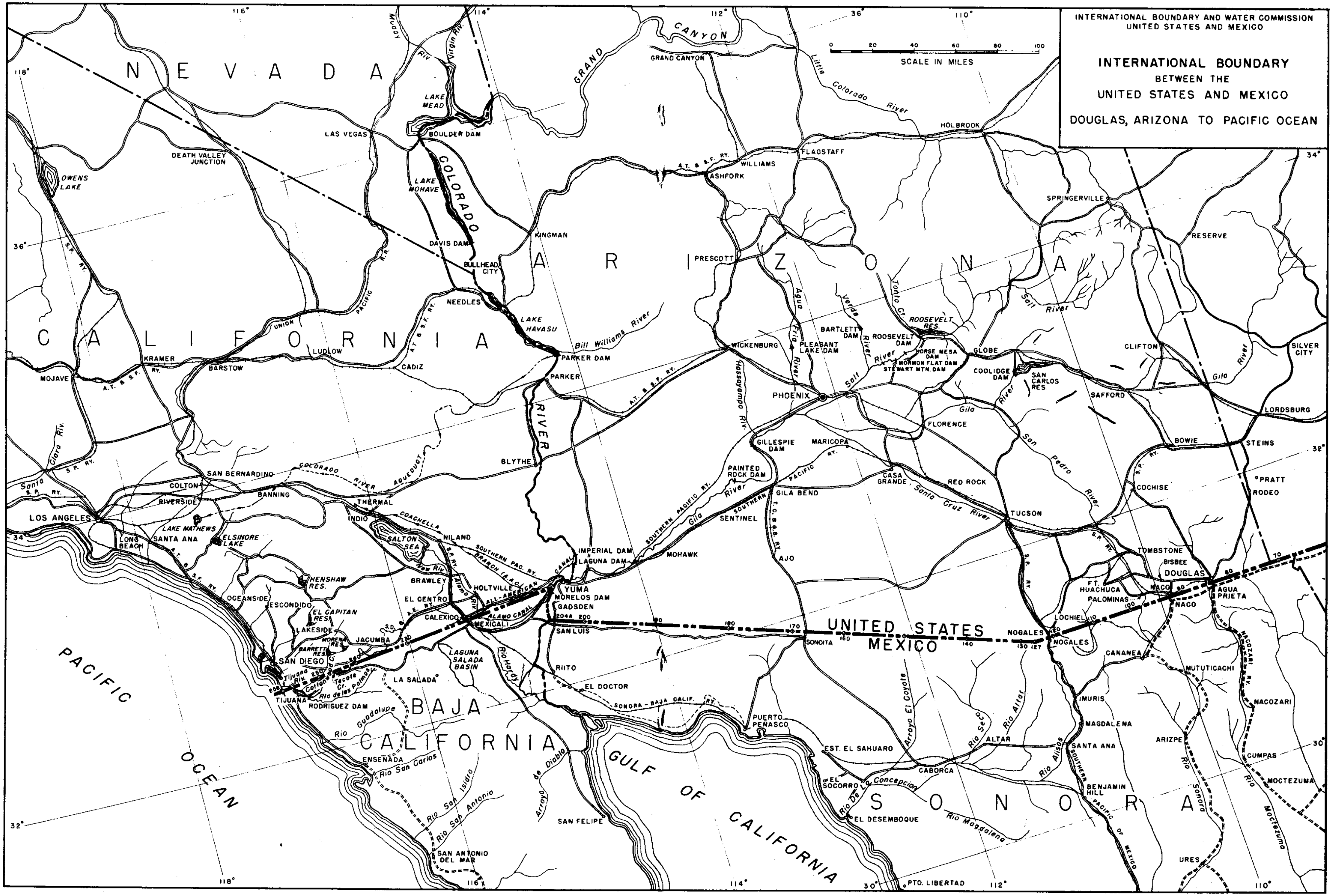
IN THE UNITED STATES

Month	Yuma Citrus Station, Arizona	
	1989	Average 1931-1989
Jan.	4.62	3.89
Feb.	4.33	4.76
Mar.	7.56	7.41
Apr.	9.81	10.02
May	11.70	12.90
June	13.12	14.19
July	15.13	15.20
Aug.	11.74	13.35
Sept.	9.62	10.55
Oct.	7.15	7.46
Nov.	4.92	4.88
Dec.	4.12	3.65
Yearly	103.82	108.26

IN MEXICO

Month	Bataques, Baja California		San Luis R. C. Sonora		Delta, Baja California		Colonia Juarez, Baja California	
	1989	Average 1948-1989	1989	Average 1953-1989	1989	Average 1948-1989	1989	Average 1970-1989
Jan.	#	3.78	#	3.27	4.61	3.39	#	3.70
Feb.	#	4.61	#	4.09	4.37	4.33	#	4.49
Mar.	#	6.85	#	6.18	5.43	6.06	#	6.54
Apr.	#	8.70	#	8.23	4.29	7.83	#	8.31
May	#	11.46	#	10.94	7.56	10.04	9.57	10.79
June	#	12.95	#	12.52	#	#	#	12.64
July	#	12.80	#	13.23	#	#	10.04	12.60
Aug.	#	11.06	#	11.81	#	#	8.58	10.79
Sept.	#	9.13	#	8.98	#	#	#	9.45
Oct.	#	6.42	#	6.26	#	#	#	7.28
Nov.	#	4.80	#	4.17	4.25	4.29	#	4.88
Dec.	#	3.43	#	3.11	4.21	3.58	#	3.15
Yearly	-	95.98	-	95.71	-	-	-	-

Missing record


INTERNATIONAL BOUNDARY AND WATER COMMISSION
UNITED STATES AND MEXICO
INTERNATIONAL BOUNDARY
BETWEEN THE
UNITED STATES AND MEXICO
DOUGLAS, ARIZONA TO PACIFIC OCEAN
SCALE IN MILES
0 20 40 60 80 100
NEVADA
CALIFORNIA
ARIZONA
BAJA CALIFORNIA
SONORA
UNITED STATES
MEXICO
PACIFIC OCEAN
GULF OF CALIFORNIA
GRAND CANYON
COLORADO
RIVER
LAS VEGAS
BOULDER DAM
LAKE MEAD
LAKE MOHAVE
DAVIS DAM
BULLHEAD CITY
KINGMAN
NEEDLES
LAKE HAVASU
PARKER DAM
PARKER
BLYTHE
Bill Williams River
DEATH VALLEY JUNCTION
OWENS LAKE
KRAMER
MOJAVE
BARSTOW
LUDLOW
CADIZ
SAN BERNARDINO
COLTON
RIVERSIDE
BANNING
LOS ANGELES
LONG BEACH
SANTA ANA
LAKE MATHEWS
ELSINORE LAKE
OCEANSIDE
ESCONDIDO
HENSHAW RES.
EL CAPITAN RES.
LAKESIDE
MORENA RES.
BARRETT RES.
SAN DIEGO
TIJUANA
JACUMBA
RODRIGUEZ DAM
LA SALADA
LAGUNA SALADA BASIN
ENSENADA
SAN ANTONIO DEL MAR
SAN FELIPE
THERMAL
INDIO
SALTON SEA
NILAND
BRAWLEY
EL CENTRO
HOLTVILLE
CALEXICO
MEXICALI
ALL-AMERICAN CANAL
ALAMO CANAL
IMPERIAL DAM
LAGUNA DAM
YUMA
MORELOS DAM
GADSDEN
SAN LUIS
RIITO
EL DOCTOR
MOHAWK
SENTINEL
GILA BEND
PAINTED ROCK DAM
GILLESPIE DAM
AJO
SONOITA
PUERTO PENASCO
EST. EL SAHUARO
EL SOCORRO
EL DESEMBOQUE
CABORCA
ALTAR
PTO. LIBERTAD
WICKENBURG
PRESCOTT
ASHFORK
WILLIAMS
FLAGSTAFF
HOLBROOK
GRAND CANYON
Little Colorado River
PHOENIX
BARTLETT DAM
PLEASANT LAKE DAM
ROOSEVELT DAM
ROOSEVELT RES.
HORSE MESA DAM
MORMON FLAT DAM
STEWART MTN. DAM
GLOBE
COOLIDGE DAM
SAN CARLOS RES
FLORENCE
MARICOPA
CASA GRANDE
RED ROCK
TUCSON
SAFFORD
CLIFTON
SPRINGERVILLE
RESERVE
SILVER CITY
LORDSBURG
BOWIE
STEINS
PRATT
RODEO
COCHISE
TOMBSTONE
BISBEE
DOUGLAS
NACO
AGUA PRIETA
FT. HUACHUCA
PALOMINAS
LOCHIEL
NOGALES
CANANEA
MUTUTICACHI
NACOZARI
IMURIS
MAGDALENA
SANTA ANA
BENJAMIN HILL
ARIZPE
CUMPAS
MOCTEZUMA
URES
Salt River
Gila River
San Pedro River
Santa Cruz River
Rio Sonora
Rio Moctezuma
Rio Magdalena
Rio Concepcion
Rio Altar
Rio Hardy
Rio Tijuana
Rio Guadalupe
Rio San Carlos
Rio San Isidro
Rio San Antonio
Arroyo de Diablo
COLORADO RIVER AQUEDUCT
COACHELLA
SOUTHERN PAC. RY.
A.T. & S.F. RY.
UNION PACIFIC R.R.
SONORA - BAJA CALIF. RY.
SOUTHERN PACIFIC OF MEXICO
116°
114°
112°
110°
118°
36°
34°
32°
30°

TEMPERATURE IN THE COLORADO RIVER BASIN

IN DEGREES FAHRENHEIT

The maximum, minimum, and monthly mean temperature observations for United States stations are from daily readings of thermometers generally exposed in a shelter located a few feet above sod-covered ground. The maximum and minimum temperatures shown for the stations in Mexico are from daily maximum and minimum thermometer observations, with maximum and minimum for their periods of record. For specific location, elevation, period of record, and the observer, refer to data opposite same station name as shown in "Location of Rainfall Stations," in this bulletin.

IN THE UNITED STATES

	Blythe, California				Yuma Citrus Station, Arizona				Brawley, California			
	1989				1989				1989			
Month	Mean	Max.	Min.	Average 1931-89	Mean	Max.	Min.	Average 1931-89	Mean	Max.	Min.	Average 1931-89
Jan.	50.0	64	36	52.7	52.0	64	40	53.2	52.4	68	37	54.0
Feb.	56.8	72	41	57.4	56.7	71	42	57.1	58.6	74	43	58.2
Mar.	67.1	85	50	63.0	66.3	83	49	62.2	67.7	84	51	63.3
Apr.	76.3	95	58	70.2	74.7	93	56	68.8	75.6	94	57	69.9
May	79.8	98	62	77.7	77.3	94	60	75.9	78.2	96	61	77.2
June	87.6	107	68	85.6	84.9	102	67	83.8	84.9	104	66	85.0
July	95.1	112	79	92.5	92.4	107	78	90.9	91.7	109	75	91.7
Aug.	90.0	106	75	90.9	89.2	103	75	90.2	89.1	105	73	91.2
Sept.	84.7	103	67	84.8	85.9	103	69	84.8	85.7	104	68	86.0
Oct.	72.5	90	55	73.1	74.0	91	57	73.5	74.8	91	58	75.0
Nov.	62.7	80	49	60.2	62.9	79	46	61.3	63.5	82	45	62.5
Dec.	53.7	69	38	53.2	54.2	70	39	54.4	55.0	73	38	55.1
Yearly	73.0	112	36	71.8	72.5	107	39	71.3	73.1	109	37	72.4

	El Centro, California				Bullhead City, Arizona			
	1989				1989			
Month	Mean	Max.	Min.	Average 1931-89	Mean	Max.	Min.	Average 1978-89
Jan.	53.8	67	41	54.1	52.9	63	43	53.6
Feb.	59.8	74	46	58.2	58.3	71	46	58.3
Mar.	68.8	83	55	63.2	69.5	87	53	63.8
Apr.	75.8	92	59	69.7	79.8	96	64	72.2
May	78.3	94	63	77.2	82.9	99	66	80.8
June	86.2	103	69	85.2	91.2	108	74	90.4
July	93.1	108	79	91.7	97.9	115	81	95.1
Aug.	89.7	103	76	91.0	93.5	109	78	93.5
Sept.	85.6	101	70	85.5	86.7	104	70	86.2
Oct.	75.3	90	61	74.6	74.6	90	59	74.4
Nov.	64.7	80	49	62.3	65.7	78	53	61.7
Dec.	56.5	72	41	54.9	55.9	68	43	53.4
Yearly	74.0	108	41	72.3	75.7	115	43	73.6

IN MEXICO

	Los Algodones, Baja California				Mexicali, Baja California				Bataques, Baja California			
	1989		1948-1989		1989		1926-1989		1989		1948-1989	
Month	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.
Jan.	77	32	88	23	77	32	93	19	79	30	113	16
Feb.	93	30	95	28	91	28	93	23	93	28	99	21
Mar.	93	43	100	32	95	45	100	30	97	41	113	25
Apr.	106	50	109	37	106	50	106	34	108	50	118	16
May	113	50	117	43	106	54	117	43	108	52	124	34
June	118	57	126	52	117	63	120	48	117	59	135	43
July	118	68	118	61	118	70	118	55	115	66	133	45
Aug.	113	66	120	61	111	70	120	54	111	63	129	46
Sept.	113	54	122	50	113	59	122	48	113	50	135	39
Oct.	108	41	111	32	#	#	#	#	#	#	#	#
Nov.	88	41	100	27	#	#	#	#	90	34	115	32
Dec.	79	32	90	23	#	#	#	#	81	30	97	25
Yearly	118	30	126	23	-	-	-	-	-	-	-	-

* Blythe FAA Airport # Missing record

TEMPERATURE IN THE COLORADO RIVER BASIN

IN DEGREES FAHRENHEIT

IN MEXICO

	Riito, Sonora				San Felipe, Baja California				San Luis, R. C., Sonora			
	1989		1949-1989		1989		1969-1988		1988		1949-1988	
Month	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.
Jan.	82	36	91	19	75	41	99	30	75	34	100	19
Feb.	91	36	95	21	91	41	102	32	100	34	109	27
Mar.	99	37	100	25	95	45	104	32	118	37	118	28
Apr.	#	#	#	#	104	59	113	34	111	43	115	36
May	115	48	115	41	104	66	120	41	115	46	120	41
June	115	54	124	45	113	61	124	50	120	57	126	45
July	115	66	140	52	108	68	124	50	122	55	126	50
Aug.	113	57	122	46	104	66	135	41	117	43	126	55
Sept.	115	50	118	39	106	59	126	37	#	#	#	#
Oct.	106	41	115	30	97	54	117	23	#	#	#	#
Nov.	97	39	118	27	84	50	118	21	93	39	113	28
Dec.	#	#	#	#	77	43	97	28	#	#	102	23
Yearly	-	-	-	-	113	41	135	21	-	-	-	-

	Delta, Baja California				Colonia Juarez, Baja California				Laguna Salada, Baja California			
	1989		1948-1989		1989		1964-1989		1989		1975-1989	
Month	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.
Jan.	82	32	104	27	#	#	91	19	#	#	#	#
Feb.	93	36	104	28	#	#	102	21	#	#	#	#
Mar.	91	39	113	28	#	#	97	25	#	#	#	#
Apr.	108	45	118	32	#	#	115	30	#	#	#	#
May	115	46	129	32	#	#	117	36	#	#	#	#
June	#	#	#	#	115	54	122	39	#	#	#	#
July	#	#	#	#	111	70	122	45	117	68	122	54
Aug.	#	#	#	#	97	68	118	50	117	68	118	52
Sept.	#	#	#	#	90	52	122	39	117	59	118	48
Oct.	#	#	#	#	86	45	108	36	106	37	118	36
Nov.	122	46	122	32	#	#	104	25	86	23	95	23
Dec.	104	41	104	27	#	#	97	19	#	#	#	#
Yearly	-	-	-	-	-	-	-	-	-	-	-	-

	El Centinela, Baja California											
	1989		1977-1989									
Month	Max.	Min.	Max.	Min.								
Jan.	86	37	86	34								
Feb.	91	34	91	25								
Mar.	99	39	99	39								
Apr.	#	#	#	#								
May	#	#	#	#								
June	#	#	#	#								
July	#	#	#	#								
Aug.	#	#	#	#								
Sept.	#	#	#	#								
Oct.	#	#	#	#								
Nov.	#	#	#	#								
Dec.	#	#	#	#								
Yearly	-	-	-	-								

Missing record

IRRIGATED AREAS ALONG COLORADO RIVER BELOW IMPERIAL DAM

1989

The total drainage area within the Colorado River basin is about 246,000 square miles, of which 184,600 square miles lie above Imperial Dam and about 61,400 square miles are below the dam. Of the area below Imperial Dam, 59,400 square miles are in the United States and about 2,000 square miles are in Mexico. The area below Imperial Dam includes the Gila River watershed with a total area of about 58,200 square miles, of which about 1,100 square miles are in Mexico.

The irrigated areas tabulated below comprise the areas in the United States and Mexico which are served by diversions from the Colorado River at or below Imperial Dam. The diversions are supplemented by some pumping from wells in both countries. The areas in the United States include: 1) those within the U. S. Bureau of Reclamation Projects and in the North and South Gila Valleys located near Yuma, Arizona, the data for which are furnished by the U. S. Bureau of Reclamation; 2) those within the Coachella Valley, California, the data for which are furnished by the U. S. Bureau of Reclamation; and 3) those within the Imperial Valley; California, the data for which are furnished by the U. S. Bureau of Reclamation. The areas in Mexico include those in the Mexicali Valley located in the states of Baja California and Sonora, the data for which are furnished by the Ministry of Agriculture and Hydraulic Resources of Mexico. The areas tabulated below refer to the total areas farmed, and insofar as possible, duplication of irrigated areas because of double cropping has been eliminated.

Point of Diversion from Colorado River and Designation of Areas	Total Irrigated Areas Acres
IN UNITED STATES:	
Imperial Dam	
Yuma Valley Division	44,749
Reservation Division	12,758
Yuma Mesa	16,729
Yuma Aux. Project Unit "B" (Yuma Mesa)	2,594
South Gila Valley	9,655
North Gila Valley	6,319
Wellton-Mohawk	59,404
Coachella Valley	58,913
Imperial Valley	449,220
Warren Act	80
Non-Project lands adjacent to Colorado River	12,560
Total in United States	672,981
IN MEXICO:	
Morelos Dam	
Mexicali Valley	* 449,715
Total in United States and Mexico	1,172,696

* An estimated 33% of total acreage is served by pumping from ground water in Mexicali Valley

10-2545.80 ALAMO RIVER AT INTERNATIONAL BOUNDARY

DESCRIPTION: Staff gage located on the right bank of the river, about 7 miles (11.3 km) east of Calexico, California, immediately downstream from the international land boundary between the United States and Mexico and a few feet upstream from a 4-foot (1.22 m) Cipolletti weir in the throat of a twin-tube concrete culvert which carries the river flow under the All-American Canal.

RECORDS: Computed on the basis of head on the Cipolletti weir from daily staff gage readings, and weir ratings as determined by monthly current meter measurements. Records obtained and furnished by Imperial Irrigation District. Records available: June 1942 through 1989.

REMARKS: The flow at this station normally comprises seepage from the All-American Canal and drainage water from the Mexicali Valley which enters the United States.

EXTREMES: Maximum mean daily discharge, 258 second-feet (7.31 m3/sec) (estimated), April 13, 1946; minimum discharge, no flow July 22-23, 29-30, 1949. Prior to the period of record, and since 1900, considerably higher flows occurred. During the years 1905 to 1907, when the Colorado River flowed into the Salton Sea, a part of its flow passed through the Alamo River channel.

Mean Daily Discharge in Second-Feet 1989 —— Annual and Period Summary

Day	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	2.96	2.75	2.86	* 3.00	* 3.00	* 3.00	* 3.00	1.80	2.00	1.50	2.10	2.30
2	2.96	3.10	2.96	* 3.00	* 3.00	* 3.00	* 3.00	1.80	2.10	1.50	2.10	2.30
3	2.75	3.10	2.96	* 3.00	* 3.00	* 3.00	* 3.00	1.80	2.30	1.50	2.00	2.30
4	* 3.25	2.96	3.24	* 3.00	* 3.00	* 3.00	* 3.00	1.80	2.30	1.50	2.00	2.30
5	3.79	2.96	3.24	* 3.00	* 3.00	* 3.00	* 3.00	1.80	2.30	5.30	2.00	2.50
6	3.52	2.96	4.07	* 3.00	* 3.00	* 3.00	* 3.00	2.00	2.30	4.10	2.00	2.30
7	3.65	2.96	3.24	* 3.00	* 3.00	* 3.00	* 3.00	2.30	2.50	3.10	2.00	2.30
8	3.24	2.75	3.79	* 3.00	* 3.00	2.50	* 3.00	2.30	2.20	2.50	2.00	2.30
9	3.52	2.54	2.96	* 3.00	* 3.00	2.70	* 3.00	3.90	1.80	2.30	2.00	2.30
10	3.52	2.54	2.96	* 3.00	* 3.00	* 3.00	* 3.00	2.10	1.70	2.10	2.10	2.30
11	3.52	2.54	2.96	* 3.00	* 3.00	* 3.00	* 3.00	2.10	2.00	2.10	2.00	2.30
12	2.75	2.54	2.96	* 3.00	* 3.00	1.80	* 3.00	2.10	2.00	2.00	2.10	2.30
13	3.93	2.65	2.96	* 3.00	* 3.00	* 3.00	* 3.00	2.30	2.00	2.00	2.10	2.10
14	2.75	2.75	2.96	* 3.00	* 3.00	* 3.00	* 3.00	2.30	1.80	2.00	2.10	2.30
15	2.96	2.54	2.96	* 3.00	* 3.00	* 3.00	1.50	2.30	1.80	2.10	2.10	2.30
16	2.96	2.54	2.96	* 3.00	* 3.00	* 3.00	1.50	2.30	1.50	2.00	2.40	2.30
17	3.79	2.54	3.24	* 3.00	* 3.00	* 3.00	2.10	2.30	2.10	2.00	2.20	2.30
18	2.75	2.96	2.75	* 3.00	* 3.00	* 3.00	1.50	2.30	2.00	2.00	2.20	2.50
19	2.54	2.75	2.96	* 3.00	* 3.00	* 3.00	1.50	2.30	1.80	2.10	2.50	2.50
20	2.54	2.75	2.96	* 3.00	* 3.00	* 3.00	2.50	2.50	1.70	1.90	2.30	2.90
21	2.44	2.96	3.52	* 3.00	* 3.00	* 3.00	1.80	2.50	1.50	2.00	2.30	3.10
22	2.54	2.96	* 3.65	* 3.00	* 3.00	* 3.00	2.30	2.50	1.70	2.00	2.30	2.50
23	2.54	2.75	* 3.65	* 3.00	* 3.00	* 3.00	2.50	2.50	1.80	2.00	2.30	2.30
24	2.54	3.24	4.07	* 3.00	* 3.00	* 3.00	2.00	2.10	1.80	2.00	2.30	2.50
25	2.54	2.96	3.38	* 3.00	* 3.00	* 3.00	2.00	2.10	1.50	2.10	2.30	2.30
26	2.96	2.96	3.79	* 3.00	* 3.00	* 3.00	2.00	2.10	1.50	2.00	2.40	2.50
27	2.75	2.96	2.96	* 3.00	* 3.00	* 3.00	2.00	2.00	1.50	2.00	2.30	4.30
28	2.75	2.86	2.75	* 3.00	* 3.00	* 3.00	2.00	2.00	1.50	2.00	2.30	4.10
29	3.24		1.00	* 3.00	* 3.00	* 3.00	1.80	1.80	1.50	2.00	2.30	3.30
30	3.24		* 1.46	* 3.00	* 3.00	* 3.00	1.80	2.00	1.50	2.10	2.40	2.90
31	2.65		* 1.92		* 3.00		1.80	2.00		2.10		2.50
Sum	93.84	78.83	94.10	90.00	93.00	88.00	74.60	68.00	56.00	67.90	65.50	79.30

Month	Current Year 1989 ø Extreme Gage Feet		ø Extreme Second-Feet				Average Second-Feet	Total Acre-Feet	Period 1943-1989 Acre-Feet		
			High		Low				Average	Maximum	Minimum
	High	Low	Day		Day						
Jan.	0.47	0.35	13	3.93	21	2.44	3.03	186	298	2,790	99.0
Feb.	.42	.36	24	3.24	! 9	2.54	2.82	156	271	2,822	90.2
Mar.	.48	.20	! 6	4.07	29	1.00	3.04	187	309	3,154	87.1
Apr.	#	#	! 1	* 3.00	! 1	* 3.00	3.00	179	327	2,222	97.0
May	#	#	! 1	* 3.00	! 1	* 3.00	3.00	184	260	1,799	73.0
June	#	.34	! 1	* 3.00	12	1.80	2.93	175	250	1,686	61.0
July	#	.34	! 1	* 3.00	!21	1.80	2.41	148	231	1,712	59.0
Aug.	.56	.34	9	3.90	! 1	1.80	2.19	135	272	1,672	65.7
Sept.	.42	.30	7	2.50	!16	1.50	1.87	111	254	1,406	83.5
Oct.	.68	.30	5	5.30	! 1	1.50	2.19	135	268	1,845	61.6
Nov.	.42	.36	19	2.50	! 3	2.00	2.18	130	278	2,080	62.4
Dec.	.60	.38	27	4.30	13	2.10	2.56	157	265	1,686	80.0
				5.30		1.00	2.60	1,883	3,283	22,146	1,071
Yearly	Meters		Cubic Meters per Second					Thousands of Cubic Meters			
				0.15		0.03	0.07	2,323	4,050	27,317	1,321

ø Mean daily ! And other days * Estimated # Missing data

10-2549.70 NEW RIVER AT INTERNATIONAL BOUNDARY

DESCRIPTION: Water-stage recorder located on the left (west) bank of the river in the limits of the city of Calexico, California, 1,400 feet (427 m) downstream (north) from the international land boundary between the United States and Mexico. Measurements are made from a foot bridge at the gage.

RECORDS: Based on a continuous record of gage heights and current meter measurements by the Imperial Irrigation District. Records computed and furnished by the District. Records available: June 1942 through 1989.

REMARKS: The New River flows northward from Mexico into the United States and thence into the Salton Sea. The flow at this station normally comprises 1) a portion of the waste and drainage water from the irrigation system in the Mexicali Valley, and 2) sewage and other wastes from Mexicali, Baja California. Flood waters enter the river from local drainage in Mexico, and such waters can reach damaging rates during violent desert storms. Waste flows from the Mexican system of canals are limited to an average annual quantity of 35,000 acre-feet (43,172,000 m3) during any successive five-year period under the provisions of Minute No. 197 of the Commission.

EXTREMES: Maximum mean daily discharge, 1,030 second-feet (29.2 m3/sec) on December 9, 1982; minimum mean daily discharge, 2 second-feet (0.06 m3/sec) on May 14, 1945. Prior to the period of record, and since 1900, much higher flows occurred. During the years 1905 to 1907, when the Colorado River flowed into the Salton Sea, a considerable part of its flow passed through the New River channel.

Mean Daily Discharge in Second-Feet 1989 —— Annual and Period Summary

Day	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	255	227	246	221	234	254	163	245	221	210	179	144
2	273	233	245	224	255	249	181	236	197	195	178	143
3	324	222	242	218	275	255	178	213	172	182	178	143
4	358	213	232	218	290	234	179	197	172	190	183	143
5	405	220	225	225	277	235	200	211	182	192	185	148
6	402	240	230	221	256	229	190	200	184	184	189	144
7	356	262	243	219	253	225	176	217	186	178	194	160
8	327	242	247	212	282	203	176	235	174	176	194	153
9	311	232	239	212	314	205	176	232	171	184	196	153
10	308	235	226	211	328	211	172	249	174	184	191	158
11	317	231	225	211	324	201	179	251	180	174	189	171
12	306	234	235	215	303	196	188	284	175	168	189	148
13	282	263	231	227	290	205	188	255	202	168	188	141
14	259	245	230	223	272	198	176	239	197	168	190	158
15	256	223	228	222	264	204	182	254	184	170	188	161
16	253	233	228	228	259	186	199	239	177	170	170	158
17	251	233	232	219	238	195	182	237	172	187	157	163
18	244	226	230	224	220	187	176	229	167	172	150	176
19	242	223	230	222	208	180	170	244	166	164	150	175
20	238	216	226	221	220	184	169	225	162	172	154	176
21	234	209	230	229	216	185	178	226	164	172	151	170
22	232	222	229	225	207	181	184	231	174	186	176	169
23	240	228	227	217	197	172	176	216	187	189	163	177
24	232	228	225	219	191	179	169	229	219	187	173	176
25	222	232	214	224	198	168	169	219	262	175	159	220
26	218	249	224	258	213	164	169	218	241	170	158	245
27	231	251	230	263	221	173	195	217	222	195	162	255
28	229	256	227	257	214	170	177	216	204	184	148	259
29	228		227	246	216	163	233	231	212	176	142	234
30	224		222	240	220	154	247	227	221	170	144	214
31	229		226		236		244	218		177		212
Sum	8,486	6,528	7,151	6,771	7,691	5,945	5,741	7,140	5,721	5,569	5,168	5,447

Month	ø Extreme Gage ** Feet		ø Extreme Second-Feet				Average Second-Feet	Total Acre-Feet	Acre-Feet		
			High		Low						
	High	Low	Day		Day				Average	Maximum	Minimum
Current Year 1989									**Period** 1943-1989		
Jan.	39.14	40.95	5	405	26	218	274	16,832	9,873	22,203	1,751
Feb.	40.51	41.04	13	263	21	209	233	12,948	8,746	21,416	1,258
Mar.	40.66	40.99	8	247	25	214	231	14,184	9,822	25,305	1,008
Apr.	40.51	41.02	27	263	!10	211	226	13,430	10,183	27,618	1,390
May	39.88	41.22	10	328	24	191	248	15,255	9,275	24,111	629
June	40.59	41.59	3	255	30	154	198	11,792	7,841	20,287	1,087
July	40.66	41.50	30	247	1	163	185	11,387	8,383	22,998	817
Aug.	40.31	41.16	12	284	4	197	230	14,162	9,663	27,618	1,139
Sept.	40.52	41.42	25	262	20	162	191	11,347	9,088	23,714	1,795
Oct.	41.03	41.49	1	210	18	164	180	11,046	9,129	22,758	2,081
Nov.	41.17	41.71	9	196	29	142	172	10,251	8,604	20,519	2,483
Dec.	40.55	41.72	28	259	13	141	176	10,804	9,737	22,784	1,763
Yearly	39.14	41.72		405		141	212	153,438	110,344	267,896	24,573
	Meters		Cubic Meters per Second					Thousands of Cubic Meters			
	11.93	12.72		11.5		3.99	6.00	189,263	136,107	330,444	30,310

ø Mean daily ! And other days ** Feet below mean sea level

10-2549.60 WASTES FROM MEXICALI POTABLE WATER PLANT TO NEW RIVER IN MEXICO

DESCRIPTION: An 11.5-foot (3.50 m) Parshall flume installed by the State Commission of Public Services of Mexicali. Located 1.2 miles (2.0 km) upstream of the pumping plant on the supply canal. Excess water discharges into an open channel, thence into a 36-inch (91 cm) diameter pipe that empties into Rivera Drain (Drain 134), which is 1.2 miles (2.0 km) below the plant and 1.2 miles (2.0 km) south of the international boundary. From this point the waste is carried by a closed concrete box conduit into New River.

RECORDS: During 1989 the mean daily flows were computed from the total inflow to the potable water plant as measured at the Parshall flume, less the water pumped to the city and the water used in the maintenance of the plant. The records are obtained and furnished by the State Commission of Public Services of Mexicali. Records available: January 1968 through December 1989.

REMARKS: The plant began operation on September 28, 1963 by the State Commission of Public Services of Mexicali. Before 1968 the flow was small and infrequent. The potable water plant obtains water from the West Main Canal, which is a part of Mexico's system of canals in the Colorado Irrigation System. Excess water discharges into a closed conduit that empties into New River 0.9 mile (1.4 km) upstream of the international boundary.

EXTREMES: Maximum instantaneous discharge, 81.9 second-feet (2.32 m3/sec) on March 26, 1969; minimum instantaneous discharge, zero during several days in the years 1977 through 1989.

Mean Daily Discharge in Second-Feet 1989 — Annual and Period Summary

Day	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	0.7	1.1	0.7	1.8	3.2	2.1	2.1	1.8	2.5	2.5	1.8	1.8
2	1.1	.7	0	1.8	1.8	1.1	2.1	1.8	2.5	2.1	1.8	1.1
3	0	.7	.7	1.8	1.8	2.1	1.8	1.8	2.1	1.8	1.8	1.8
4	0	.7	0	1.8	1.8	1.8	1.8	1.8	2.1	1.8	1.8	1.8
5	1.1	0	0	1.8	1.8	2.1	1.8	1.8	1.8	2.1	1.8	1.8
6	1.1	1.1	0	1.8	.7	2.5	1.8	1.8	1.8	1.8	.4	1.8
7	1.1	.7	1.8	1.8	2.1	2.5	1.8	1.8	1.8	1.8	1.8	1.8
8	.7	.7	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8
9	1.1	.7	1.1	1.8	1.8	2.8	1.8	1.8	1.8	2.1	1.8	1.8
10	.7	.7	1.1	1.8	4.2	2.1	1.8	1.8	1.8	1.8	1.8	1.8
11	1.1	.4	1.8	1.8	1.8	2.1	1.8	1.8	1.8	1.8	1.8	2.1
12	1.1	0	.7	1.8	1.8	2.1	1.8	1.8	1.8	1.8	2.1	1.8
13	.7	1.1	0	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.1
14	1.1	1.8	1.8	0	1.8	1.8	1.8	1.8	2.8	1.8	1.8	0
15	.7	1.8	1.8	2.5	1.8	3.5	1.8	2.5	1.8	1.8	1.8	1.8
16	0	1.8	1.8	2.1	1.8	2.1	1.8	1.8	1.8	1.8	1.8	1.8
17	.7	1.8	1.8	.7	1.8	1.8	1.8	2.1	1.8	1.8	1.8	1.8
18	.7	0	0	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8
19	1.1	1.1	1.8	1.8	1.8	2.1	1.8	2.5	1.8	1.8	1.8	1.8
20	1.1	0	.4	1.8	2.1	1.8	1.8	1.8	1.8	1.8	2.5	1.8
21	.7	.7	1.8	2.1	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8
22	.7	1.8	1.1	1.8	1.8	2.5	1.8	2.5	1.8	1.8	1.8	1.8
23	.7	1.8	1.8	2.8	1.8	2.1	1.8	1.8	1.8	1.8	1.8	2.1
24	.4	0	1.8	4.2	1.8	2.1	1.8	2.1	1.8	1.8	1.8	1.8
25	1.1	1.8	1.1	2.5	0	1.8	1.8	1.8	1.8	1.8	1.8	2.1
26	1.1	1.8	1.1	4.2	2.5	2.1	1.8	1.8	1.8	1.8	1.1	1.8
27	1.1	.4	1.8	1.8	1.8	1.8	1.8	2.1	1.8	1.8	1.8	1.8
28	.7	1.8	1.8	1.8	2.1	1.8	1.8	1.8	1.8	1.8	1.8	1.8
29	.7		1.8	3.9	1.8	2.1	1.8	2.1	1.8	1.8	1.8	1.8
30	.7		1.8	2.1	2.1	1.8	1.8	2.1	1.8	1.8	1.1	1.8
31	1.1		1.8		1.8		1.8	1.8		1.8		1.8
Sum	24.9	27.0	36.8	61.3	58.6	61.7	56.4	59.4	57.0	57.4	52.2	53.5

Month	Current Year 1989								Period 1968-1989		
	Extreme Gage Feet		Ø Extreme Second-Feet				Average Second-Feet	Total Acre-Feet	Acre-Feet		
			High		Low				Average	Maximum	Minimum
	High	Low	Day		Day						
Jan.			! 2	1.1	! 3	0	0.7	48.3	153	520	0
Feb.			!14	1.8	! 5	0	1.1	52.5	96.5	311	0
Mar.			! 7	1.8	! 2	0	1.1	71.4	194	871	33.6
Apr.			!24	4.2	14	0	2.1	121	187	431	68.1
May			10	4.2	25	0	1.8	115	199	435	46.2
June			15	3.5	2	1.1	2.1	122	179	409	21.0
July			! 1	2.1	! 3	1.8	1.8	110	223	528	0
Aug.			!15	2.5	! 1	1.8	1.8	116	243	596	77.0
Sept.			14	2.8	! 5	1.8	1.8	111	228	549	58.1
Oct.			1	2.5	! 3	1.8	1.8	112	212	507	35.8
Nov.			20	2.5	6	.4	1.8	101	188	504	54.6
Dec.			!11	2.1	14	0	1.8	105	176	597	32.9
				4.2		0	1.8	1,185	2,319	5,359	857
Yearly	Meters		Cubic Meters per Second						Thousands of Cubic Meters		
				0.12		0	0.05	1,462	2,860	6,610	1,057

Ø Mean daily ! And other days

10-2549.65 WASTE WATERS FROM MEXICAN SYSTEM OF CANALS ENTERING THE UNITED STATES

DESCRIPTION: During 1989 the only flow to the New River in Mexico was waste from the City of Mexicali Potable Water Plant, which discharges into Rivera Drain and then to New River, and drainage water coming from the Colorado River District system of canals that enter the New River below Laguna Xochimilco.

RECORDS: Records of the Potable Water Plant are based on flows measured on a Parshall flume less pumping to the city. Records obtained and furnished by the State Commission of Public Sevices of Mexicali. Records available: Wisteria Wasteway, January 1951 through 1975; Sifon Wasteway, January 1952 to April 30, 1964; Pueblo Nuevo Wasteway, January 1956 through 1965; and the Potable Water Plant, January 1968 through December 1989.

REMARKS: To obtain data for Sifon and Pueblo Nuevo Wasteways, see bulletins 1 to 6 (1960-1965);and for Wisteria Wasteway, bulletins 1 to 16 (1960-1975). For data on wastes from Potable Water Plant, see previous page of this bulletin.

Monthly Discharge in Acre-Feet

Month	Current Year 1989	Period 1956-1989		
		Average	Maximum	Minimum
January	48.3	930	8,758	6.3
February	83.5	657	7,281	6.3
March	71.4	471	2,610	21.7
April	121	426	3,194	16.1
May	115	286	1,176	9.1
June	122	370	5,670	0
July	110	553	10,251	0
August	116	537	4,137	0
September	111	409	3,215	21.0
October	112	539	3,474	8.4
November	101	560	3,784	0
December	105	882	8,691	0
Yearly	1,216	6,624	27,430	399
	Thousands of Cubic Meters			
	1,500	8,171	33,835	492

10-2540.05 SALTON SEA - ELEVATIONS OF WATER SURFACE

DESCRIPTION: Water-stage recorder and staff gage located on the western shore of the Salton Sea, 15.5 miles (24.9 km) northwest of Westmorland, Imperial County, California. The Salton Sea is the sink of a closed basin which has a drainage area of 8,360 square miles (21,652 km2). Zero of the gage is 250.00 feet (76.2 m) below mean sea level, U. S. C. & G. S. datum.

RECORDS: Records of water surface elevations available from November 1904 through 1989. From January 1925 to October 22, 1951, once monthly records of elevations were collected by Imperial Irrigation District from a bench mark at Figtree John's Spring, about 22 miles (35.4 km) northwest along the western shore from the present gage. Since October 24, 1951, a continuous record of gage heights has been obtained by the U. S. Geological Survey at new gaging station published as "Salton Sea near Westmorland, California." The elevation of the old station is at a datum of one foot (0.30 m) higher than that of the present station. All records reported below and the area and capacity table are adjusted to the datum of the present station.

REMARKS: Runoff from the basin, irrigation drainage and waste water from Imperial and Coachella Valleys in the United States, and drainage and waste water from part of the Mexicali Valley in Mexico discharge into the Salton Sea. Water from Mexico enters the United States in the Alamo and New River channels. The bottom of the sea is 277.7 feet (84.6 m) below mean sea level, U. S. C. & G. S. datum.

EXTREMES: Maximum elevation during year, 227.3 feet (69.3 m) below mean sea level. Minimum elevation during year, 228.7 feet (69.7 m) below mean sea level. Extremes for period of record, maximum elevation 195.9 feet (59.7 m) below mean sea level, February 10 to March 29, 1907; minimum elevation since 1906, 251.6 feet (76.7 m) below mean sea level in November 1924.

MEAN DAILY WATER SURFACE ELEVATION IN FEET BELOW MEAN SEA LEVEL - 1989

Day	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	228.1	227.9	227.8	227.5	227.4	227.5	227.8	228.0	228.3	228.6	228.7	228.6
2	228.1	227.9	227.7	227.5	227.4	227.5	227.8	228.0	228.3	228.6	228.7	228.6
3	228.1	227.9	227.7	227.5	227.4	227.6	227.8	228.0	228.3	228.6	228.7	228.6
4	228.1	227.9	227.7	227.4	227.4	227.6	227.8	227.0	228.3	228.6	228.7	228.6
5	228.1	227.9	227.7	227.4	227.4	227.6	227.8	228.0	228.3	228.6	228.7	228.6
6	228.1	227.9	227.7	227.4	227.4	227.6	227.8	228.0	228.3	228.6	228.7	228.6
7	228.1	227.9	227.7	227.4	227.4	227.6	227.8	228.0	228.3	228.6	228.7	228.6
8	228.1	227.9	227.7	227.4	227.4	227.6	227.8	228.0	228.3	228.6	228.7	228.6
9	228.1	227.9	227.6	227.4	227.4	227.6	227.8	228.0	228.3	228.6	228.7	228.6
10	228.1	227.9	227.6	227.4	227.4	227.6	227.8	228.0	228.3	228.6	228.7	228.6
11	228.1	227.8	227.6	227.4	227.4	227.6	227.8	228.0	228.3	228.6	228.6	228.6
12	228.1	227.8	227.6	227.4	227.5	227.6	227.8	228.0	228.3	228.6	228.6	228.6
13	228.0	227.8	227.6	227.4	227.5	227.6	227.8	228.0	228.4	228.6	228.6	228.6
14	228.0	227.8	227.6	227.4	227.5	227.6	227.8	228.0	228.4	228.6	228.6	228.6
15	228.0	227.8	227.6	227.4	227.5	227.6	227.8	228.0	228.4	228.6	228.6	228.6
16	228.0	227.8	227.6	227.4	227.5	227.6	227.8	228.0	228.4	228.8	228.6	228.6
17	228.0	227.8	227.6	227.3	227.5	227.6	227.8	228.0	228.4	228.6	228.6	228.5
18	228.0	227.8	227.6	227.3	227.5	227.6	227.8	228.0	228.5	228.6	228.6	228.5
19	228.0	227.8	227.6	227.3	227.5	227.6	227.8	228.1	228.5	228.6	228.6	228.5
20	228.0	227.8	227.5	227.3	227.5	227.7	227.8	228.1	228.5	228.6	228.6	228.5
21	228.0	227.8	227.5	227.3	227.5	227.7	227.8	228.1	228.5	228.6	228.6	228.5
22	228.0	227.8	227.5	227.3	227.5	227.7	227.8	228.2	228.5	228.6	228.6	228.5
23	228.0	227.8	227.5	227.4	227.5	227.7	227.9	228.2	228.5	228.6	228.6	228.5
24	228.0	227.8	227.5	227.4	227.5	227.7	227.9	228.2	228.5	228.6	228.6	228.5
25	227.9	227.8	227.5	227.4	227.5	227.7	227.9	228.2	228.5	228.7	228.6	228.5
26	227.9	227.8	227.5	227.4	227.5	227.7	227.9	228.2	228.5	228.7	228.6	228.5
27	227.9	227.8	227.5	227.4	227.5	227.7	227.9	228.2	228.5	228.7	228.6	228.5
28	227.9	227.8	227.5	227.4	227.5	227.7	227.9	228.2	228.5	228.7	228.6	228.5
29	227.9		227.5	227.4	227.5	227.7	227.9	228.2	228.5	228.7	228.6	228.4
30	227.9		227.5	227.4	227.5	227.8	227.9	228.3	228.6	228.7	228.6	228.4
31	227.9		227.5		227.5		227.9	228.3		228.7		228.4
Avg.	228.0	227.8	227.6	227.4	227.5	227.6	227.8	228.1	228.4	228.6	228.6	228.5

Current Year 1989			Period 1935-1989		
Month	Ø Extreme Elevation Feet		Elevation Feet		
	High	Low	# Average	# Maximum	! Minimum
Jan.	227.9	228.1	235.51	227.4	249.3
Feb.	227.8	227.9	235.21	227.1	248.8
Mar.	227.5	227.8	234.94	227.0	248.6
Apr.	227.3	227.5	234.76	226.9	248.7
May	227.4	227.5	234.74	226.8	248.5
June	227.5	227.8	234.89	227.0	248.8
July	227.8	227.9	235.06	227.1	249.1
Aug.	228.0	228.3	235.24	227.2	249.4
Sept.	228.3	228.6	235.44	227.3	249.4
Oct.	228.6	228.7	235.52	227.4	249.8
Nov.	228.6	228.7	235.54	227.5	250.0
Dec.	228.4	228.6	235.42	227.5	249.6
Yearly	227.3	228.7	235.19	227.1	250.0

Area and Capacity Table		
Elevation	Area	Capacity
Feet Below M.S.L.	Acres	Acre-Feet
277.7	0	0
274.0	20,600	25,700
270.0	62,900	188,700
266.0	94,600	510,600
260.0	122,600	1,170,000
256.0	134,700	1,684,000
252.0	148,800	2,250,000
248.0	179,700	3,562,000
240.0	196,900	4,315,000
235.0	221,800	5,360,000
230.0	235,800	6,504,000
220.0	262,000	8,993,000
210.0	288,500	11,740,000
200.0	315,500	14,760,000

Ø Mean daily # Mean monthly ! Reading near first day of month

CHEMICAL ANALYSES OF WATER SAMPLES

The tables below are based on samples collected and analyzed by the State of California Department of Water Resources. New River samples prior to 1985 collected and analyzed by the U. S. Geological Survey. Beginning December 1971, not all constituents analyzed.

Samples from the Alamo River are taken north of the international boundary at upstream end of box culvert under the All-American Canal. Flow at this point includes drainage flows across international boundary and flows from drain intercepts along toe of south bank of All-American Canal. Samples from New River are taken from the right bank at road bridge 450 feet north of international boundary. Records of sampling extend from April 1951 through 1989.

ALAMO RIVER

1989 Date	Time Std.	Streamflow Momentary Sec.-Ft.	Specific Conductance Micromhos	pH Units	Hardness, Total (as CaCO3) mg/L	Sulfate ion (SO4) Dissolved mg/L	Chloride ion (Cl) Dissolved mg/L	Solids Dissolved (Calculated) mg/L
Mar. 15	1145	2.96	5,340	7.7	1,100	1,020	1,120	3,760
June 28	0950	3.00 *	4,520	8.3	944	950	993	3,370
Sep. 6	1030	2.30	4,220	8.2	929	910	447	3,100
Dec. 9	1545	2.30	5,350	8.0	1,120	1,070	1,140	3,910

NEW RIVER

1989 Date	Time Std.	Streamflow Momentary Sec.-Ft.	Specific Conductance Micromhos	pH Units	Hardness, Total (as CaCO3) mg/L	Sulfate ion (SO4) Dissolved mg/L	Chloride ion (Cl) Dissolved mg/L	Solids Dissolved (Calculated) mg/L
Mar. 15	1310	225	4,580	7.7	952	703	1,020	3,100
June 28	0900	184	4,520	7.4	867	684	1,100	3,120
Sep. 6	0930	183	3,970	7.5	880	664	994	3,970
Dec. 9	1500	153	4,280	8.0	946	662	1,040	3,090

* Estimated

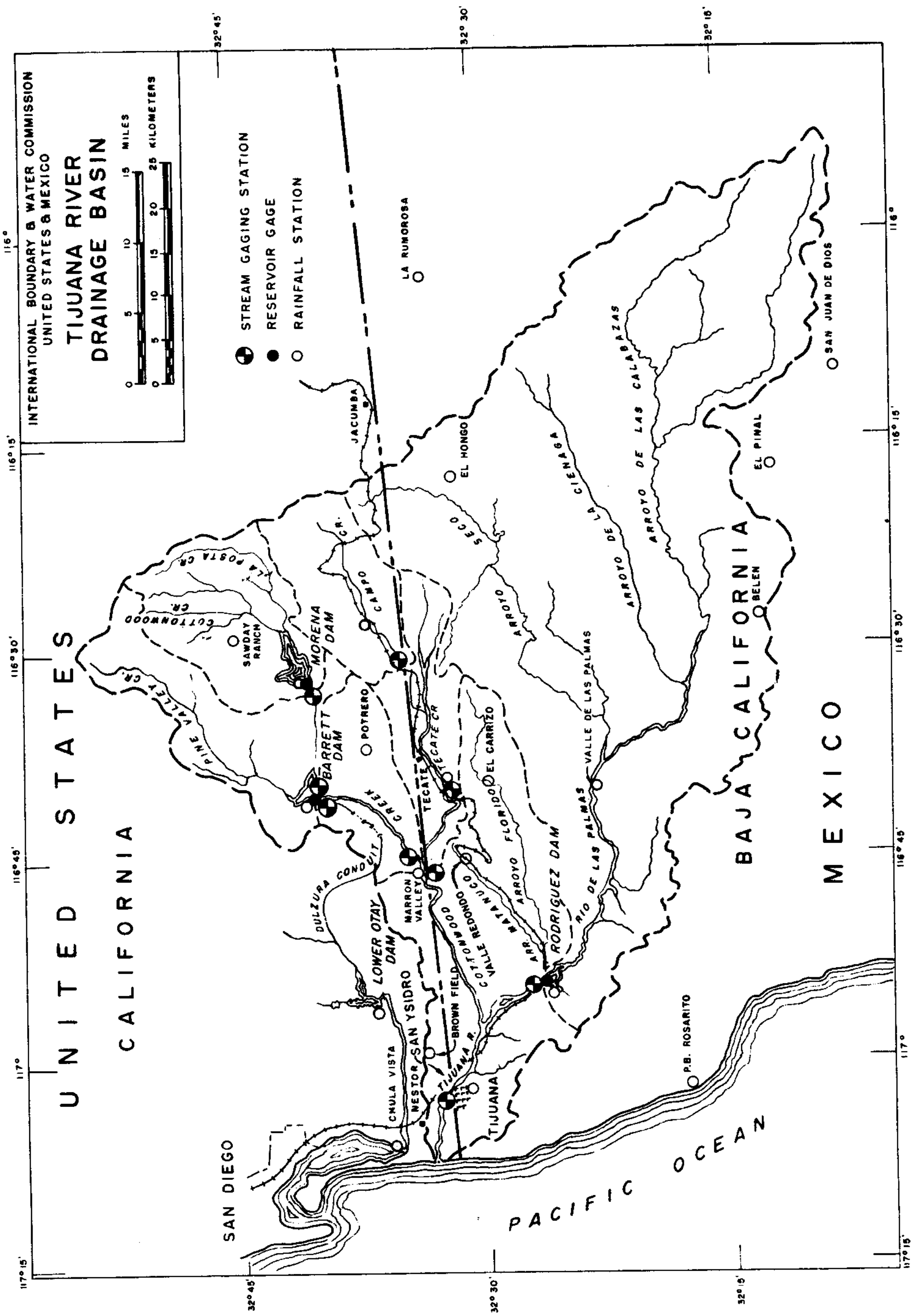
SPECIFIC CONDUCTANCE OF WATER SAMPLES

The following table shows specific conductance of individual water samples from the New River in Mexico at the international boundary. Samples were taken by the Mexican Section of the Commission, who also made the determinations.

NEW RIVER AT INTERNATIONAL BOUNDARY

SPECIFIC CONDUCTANCE OF WATER SAMPLES IN MICROMHOS/CM @ 25 DEG C - 1989

January		March		April		June		August		September		November	
4	3,900	1	4,400	26	5,100	14	4,900	2	5,600	20	5,600	8	5,200
11	4,000	8	5,000	May		21	5,400	9	5,100	27	4,800	15	5,200
18	4,800	15	5,200	3	5,800	28	5,800	16	5,300	October		22	5,900
25	5,000	22	5,400	10	6,000	July		23	5,000	4	4,400	29	6,200
February		29	5,200	17	4,900	5	5,900	30	5,000	11	5,200	December	
1	4,800	April		24	5,800	12	5,800	September		18	5,400	6	6,100
8	4,800	5	5,600	31	5,200	19	5,400	6	5,400	25	5,200	13	6,000
15	4,900	12	5,400	June		26	5,700	13	5,600	November		20	5,500
22	5,100	19	5,400	7	4,800					1	5,300	27	5,000


INTERNATIONAL BOUNDARY & WATER COMMISSION
UNITED STATES & MEXICO
TIJUANA RIVER
DRAINAGE BASIN
0 5 10 15 MILES
0 5 10 15 20 25 KILOMETERS
STREAM GAGING STATION
RESERVOIR GAGE
RAINFALL STATION
UNITED STATES
CALIFORNIA
BAJA CALIFORNIA
MEXICO
PACIFIC OCEAN
SAN DIEGO
CHULA VISTA
NESTOR
SAN YSIDRO
TIJUANA
TIJUANA R.
BROWN FIELD
LOWER OTAY DAM
DULZURA CONDUIT
MARRON VALLEY
COTTONWOOD
VALLE REDONDO
ARR. MATANUCO
ARROYO FLORIDO
RODRIGUEZ DAM
RIO DE LAS PALMAS
VALLE DE LAS PALMAS
EL CARRIZO
TECATE
TECATE CR.
CREEK
BARRETT DAM
POTRERO
MORENA DAM
SAWDAY RANCH
COTTONWOOD CR.
LA POSTA CR.
PINE VALLEY CR.
CAMPO
CAMPO CR.
SECO
ARROYO
JACUMBA
EL HONGO
LA RUMOROSA
ARROYO DE LA CIENAGA
ARROYO DE LAS CALABAZAS
EL PINAL
BELEN
SAN JUAN DE DIOS
P.B. ROSARITO
32° 45'
32° 30'
32° 15'
116°
116° 15'
116° 30'
116° 45'
117°
117° 15'

11-0100.00 COTTONWOOD CREEK ABOVE MORENA DAM, CALIFORNIA

DESCRIPTION: Staff gage located on east side of outlet tower immediately upstream from face of Morena Dam. The dam is located on Cottonwood Creek 1.8 miles (2.9 km) upstream from the mouth of Hauser Creek, 8.5 miles (13.7 km) upstream from Barrett Dam, and about 20 miles (32.2 km) upstream from the international boundary. The zero of the gage is 2,882.4 feet (878.56 m) above mean sea level, U. S. C. & G. S. datum.

RECORDS: Reservoir inflows shown below were computed from monthly reservoir records of storage, releases, spills, leakage, evaporation, and rainfall, by the International Boundary and Water Commission, United States Section. They represent all water reaching Morena Reservoir, including rainfall on reservoir water surface. Basic data were furnished by the city of San Diego, California. Records April 1911 through 1989.

REMARKS: Storage began in Morena Reservoir March 1910. Reservoir capacity and area ratings date from 1910 when Morena Dam was completed. Records for 1989 computed on basis of area-capacity curves determined from 1948 resurvey. Various changes have been made to the spillway section since construction of the dam. Elevation of the present crest of ungated spillway is 157.00 feet (47.85 m), gage datum. Reservoir capacity at spillway crest, 1948 survey, is 50,210 acre-feet (61,934,000 m3). The entire capacity of Morena Reservoir is used to furnish a part of the water supply of the city of San Diego, California. Water is released from Morena Reservoir down Cottonwood Creek to Barrett Reservoir as required.

EXTREMES: Maximum monthly inflow since 1937, 45,274 acre-feet (55,845,000 m3), March 1983. Prior to 1937, maximum monthly inflow, 37,200 acre-feet (45,886,000 m3), January 1916; minimum no flow during parts of many years.

Monthly Discharge in Acre-Feet

Month	Current Year 1989	Period 1937-1989		
		Average	Maximum	Minimum
January	148	696	7,472	0
February	298	2,024	33,569	8.0
March	128	2,982	45,274	19.3
April	279	1,687	23,130	3.3
May	9.0	850	15,113	0
June	2,298	476	8,247	0
July	187	300	6,203	0
August	67.0	256	7,228	0
September	117	172	5,133	0
October	15.0	156	3,905	0
November	2.0	258	4,567	0
December	9.0	680	7,679	4.4
Yearly	3,557	10,537	143,966	121
	Thousands of Cubic Meters			
	4,387	12,997	177,579	149

11-0105.00 COTTONWOOD CREEK BELOW MORENA DAM, CALIFORNIA

DESCRIPTION: Two water-stage recorders, one on the upstream side of the southeast abutment of Morena Dam for measuring head on the spillway crest and one immediately below the dam with a rectangular control weir for measuring ordinary reservoir releases, and cableway located about 0.8 mile (1.3 km) downstream from the dam, Discharge measurements made at the cableway include leakage, controlled releases, and spillway discharges.
RECORDS: Monthly records shown below represent the water available immediately below Morena Dam, consisting of spillway waste, draft, and leakage from the dam. They are computed by the International Boundary and Water Commission, United States Section, from basic data furnished by the city of San Diego, California. Records available: January 1911 through 1989.
REMARKS: Flows at this station are regulated by Morena Dam; storage began March 1910. Water is released from Morena Reservoir as required and flows down the natural channel of Cottonwood Creek to Barrett Reservoir. There are no major diversions above Morena dam.
EXTREMES: Maximum monthly discharge since 1937, 45,088 acre-feet (55,615,000 m3) March 1983. Prior to 1937, maximum monthly discharge, 21,400 acre-feet (26,397,000 m3), February 1916; minimum, no flow during several months of various years.

Monthly Discharge in Acre-Feet

Month	Current Year 1989	Period 1937-1989		
		Average	Maximum	Minimum
January	1,530	220	2,094	0
February	453	871	15,926	0
March	2,759	1,731	45,088	0
April	3,602	1,386	22,829	0
May	3,120	738	14,674	0
June	2,779	542	7,507	0
July	27.0	306	5,056	0
August	24.0	291	6,435	0
September	21.0	333	5,880	0
October	22.0	184	3,761	0
November	21.0	215	4,111	0
December	22.0	439	7,377	0
Yearly	14,380	7,256	136,550	0
	Thousands of Cubic Meters			
	17,737	8,950	168,432	0

11-0110.00 COTTONWOOD CREEK ABOVE BARRETT DAM, CALIFORNIA

DESCRIPTION: Staff gage located immediately upstream from face of dam on west side of outlet tower. Barrett Dam is located on Cottonwood Creek 8.5 miles (13.7 km) downstream from Morena Dam, 1 mile (1.6 km) downstream from the mouth of Pine Valley Creek, and about 12 miles (19.3 km) upstream from the international boundary. Zero of gage is 1,446.12 feet (440.78 m) above mean sea level, U. S. C. & G. S. datum.

RECORDS: Records reported below represent all water reaching Barrett Dam from the sub-basin below Morena Dam, including rainfall on the reservoir water surface. Leakage, releases, and spills from Morena Reservoir are not included. The inflows were computed from monthly reservoir records of storage, releases, spills, leakage evaporation, and rainfall furnished by the city of San Diego, California. Records available: January 1921 through 1989. Records of stream flow for a station at the dam site are also available for the periods 1906-1915 and 1917-1920.

REMARKS: Storage began at Barrett Reservoir in January 1921. The area-capacity-elevation curves used in the inflow calculations are dated 1948, 1951, and 1955 and were furnished by the city of San Diego, California. Capacity of reservoir at top of flash gates on spillway (gage height 168.88 feet (51.47 m)) is 44,755 acre-feet (55,205,000 m3). Capacity at spillway crest (gage height 160.88 feet (49.04 m)) is 37,950 acre-feet (46,811,000 m3). Dead storage, 719 acre-feet (887,000 m3) below lowest outlet (gage height (58.88 feet) (17.95 m) is included in these capacities. The entire capacity of Barrett Reservoir is used to furnish a part of the water supply of the city of San Diego, California.

EXTREMES: Maximum monthly discharge since 1937, 54,755 acre-feet (67,540,000 m3) February 1980. Prior to 1937, maximum monthly discharge, 54,800 acre-feet (67,595,000 m3) February 1927; minimum, no flow during several months of various years.

Monthly Discharge in Acre-Feet

Month	Current Year 1989	Period 1937-1989		
		Average	Maximum	Minimum
January	2,143	822	4,926	5.2
February	571	2,666	54,755	7.6
March	3,497	4,256	45,700	14.1
April	3,746	2,041	21,630	10.2
May	3,311	872	8,311	0
June	2,627	400	3,906	0
July	.6	190	1,687	0
August	5.0	118	596	0
September	.5	122	759	0
October	7.9	98.7	645	0.1
November	22.7	184	1,241	0
December	53.0	546	5,549	1.7
Yearly	15,985	12,316	114,330	129
	Thousands of Cubic Meters			
	19,717	15,192	141,024	159

11-0114.90 DULZURA CONDUIT BELOW BARRETT DAM, CALIFORNIA

DESCRIPTION: Water-stage recorder 0.5 mile (0.8 km) downstream from Barrett Dam on right bank of Dulzura Conduit 50 feet (15.2 m) upstream from road crossing to Barrett Dam. Elevation of gage has not been determined.
RECORDS: Computed on basis of head on control section of flume, as measured by water-stage recorder, and rating curve determined from current meter measurements. Records obtained and furnished by the city of San Diego, California. Records available: January 1909 through 1989.
REMARKS: Barrett Dam was completed in 1921. Prior to this date the intake of Dulzura Conduit was located 1.5 miles (2.4 km) upstream. The conduit carries diversions from Barrett Reservoir on Cottonwood Creek westerly across the divide into Otay Reservoir for municipal use by the city of San Diego. Prior to September 30, 1958, station was located 8 miles (12.9 km) along the conduit from Barrett Dam, being reported as "Dulzura;" and the draft from Barrett Reservoir was computed from the discharges obtained at the conduit gaging station, multiplied by the factor 1.05 to allow for channel loss in the reach from the reservoir to the gaging station.
EXTREMES: Since 1937: Maximum mean daily discharge, 55 second-feet (1.56 m3/sec) on March 15, 1954; minimum discharge, no flow for long periods on many occasions.

Mean Daily Discharge in Second-Feet 1989 —— Annual and Period Summary

Day	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	3.9	14.4	0	29.6	30.3	25.5	26.3	26.5	29.2	0	22.3	2.7
2	3.9	14.4	0	29.8	30.5	25.5	26.1	26.3	30.3	0	22.1	12.4
3	3.9	14.4	4.6	30.1	30.5	25.7	26.1	25.9	29.8	0	22.1	12.4
4	4.4	20.8	11.9	30.3	0	25.7	26.3	25.5	30.1	0	21.9	12.4
5	4.4	20.6	20.4	30.5	0	25.7	26.3	25.3	29.6	3.2	21.9	12.4
6	4.6	20.6	24.9	26.9	0	26.1	26.1	25.1	29.2	11.4	21.9	25.5
7	4.6	23.9	24.9	27.1	0	26.1	26.1	24.9	29.0	25.5	21.9	25.5
8	4.8	23.7	24.7	27.1	0	26.1	26.1	33.0	29.0	0	21.8	25.5
9	4.8	23.5	25.1	27.1	0	26.1	25.9	31.5	28.4	0	21.6	26.9
10	4.8	23.5	29.8	27.5	0	26.3	25.7	31.7	28.4	0	21.6	26.9
11	4.8	23.3	29.8	27.8	0	26.3	25.7	32.0	28.4	0	21.6	26.9
12	4.8	23.3	30.1	27.8	0	26.7	25.5	32.0	28.4	0	21.6	8.7
13	4.8	23.1	30.3	28.0	0	27.3	25.5	32.6	28.4	0	21.2	8.7
14	5.3	0	30.5	28.0	0	27.5	25.5	32.8	28.2	0	21.2	8.7
15	5.3	0	30.7	28.2	0	27.3	25.5	32.8	28.4	0	21.0	25.9
16	5.3	0	29.6	28.2	0	27.3	25.5	32.8	28.4	11.4	22.7	25.7
17	5.3	0	29.8	28.4	0	27.1	25.3	31.5	28.2	11.4	26.7	25.5
18	5.8	0	29.8	28.6	2.9	26.9	25.3	31.3	28.2	23.7	26.7	25.5
19	0	0	29.8	28.8	2.7	26.9	25.3	30.9	28.2	23.7	26.5	25.1
20	0	0	30.3	28.8	24.9	26.9	25.3	30.5	28.2	23.7	26.5	24.9
21	0	0	30.3	29.0	24.7	26.9	25.5	30.3	28.2	23.5	26.5	24.7
22	0	0	30.1	29.2	24.9	26.9	25.7	30.3	27.5	23.5	26.3	24.3
23	0	0	30.1	29.2	24.9	26.7	25.7	30.3	27.3	23.3	25.9	23.9
24	3.5	0	30.3	29.4	24.9	26.7	25.9	30.3	27.5	23.3	25.7	23.5
25	5.3	0	30.3	29.4	24.9	26.7	25.9	30.3	27.8	23.3	25.7	23.5
26	11.2	0	30.9	29.6	25.1	26.9	26.3	30.3	28.2	22.7	25.5	23.5
27	11.2	0	31.1	29.6	25.1	26.9	26.3	15.0	28.4	22.7	25.3	23.5
28	13.6	0	31.3	29.8	25.1	26.9	26.7	15.1	29.0	22.5	0	23.3
29	13.6		28.8	29.8	25.3	26.5	26.5	30.1	0	22.7	0	22.9
30	13.6		29.0	30.1	25.5	26.3	26.5	29.2	0	22.5	0	22.7
31	13.6		29.2		25.5		26.7	29.2		22.5		0
Sum	171.1	269.5	798.4	863.7	397.7	796.4	803.1	895.3	799.9	386.5	635.7	624.0

Month	Extreme Gage Feet		ø Extreme Second-Feet				Average Second-Feet	Total Acre-Feet	Period 1937-1989 Acre-Feet		
			High		Low				Average	Maximum	Minimum
	High	Low	Day		Day						
Jan.			28!	13.6	19!	0	5.5	339	423	2,350	0
Feb.			7	23.9	14!	0	9.6	535	444	2,130	0
Mar.			28	31.3	1!	0	25.7	1,584	581	2,330	0
Apr.			5	30.5	6	26.9	28.8	1,713	811	2,860	0
May			1!	26.2	4!	0	12.8	789	925	3,040	0
June			14	27.5	1!	25.5	26.5	1,580	985	2,920	0
July			28!	26.7	17!	25.3	25.9	1,593	864	2,920	0
Aug.			14!	32.8	27	15.0	28.9	1,776	805	2,820	0
Sept.			2	30.3	29!	0	26.7	1,587	664	2,320	0
Oct.			7	25.5	1!	0	12.5	767	555	2,450	0
Nov.			17!	26.7	28!	0	21.2	1,261	568	2,760	0
Dec.			9!	26.9	31	0	20.1	1,238	512	2,305	0
				32.8		0	20.4	14,762	8,137	27,170	0
Yearly	Meters		Cubic Meters per Second					Thousands of Cubic Meters			
				0.93		0	0.58	18,209	10,037	33,514	0

ø Mean daily ! And other days

11-0111.00 COTTONWOOD CREEK BELOW BARRETT DAM, CALIFORNIA

DESCRIPTION: Water-stage recorder and cableway located about 2.5 miles (4.0 km) downstream from Barrett Dam and 0.5 mile (0.8 km) upstream from Rattlesnake Canyon for measuring Barrett Dam spills; and staff gage and control weir located immediately below the dam for measuring leakage. The elevation of the gage is about 1,000 feet (305 m) (from topographic map).

RECORDS: Data furnished by the city of San Diego, California. Prior to January 1953, the records were furnished by the city of San Diego and reviewed and revised by the United States Section of the Commission. The recorder is to be operated only when Barrett Reservoir is near or above spillway level. Spillway discharges have occurred in May 1943, March, April 1979, January to May of 1980, April, December 1982, and the entire year of 1983. Spillway discharges included in the period record below were computed by the city of San Diego from the head on the spillway crest, read on the reservoir gage, and applied to a broad-crested weir formula. Records available: January 1921 through 1989. Storage began in Barrett Reservoir in January 1921.

REMARKS: Records reported below represent the water available in the natural channel of Cottonwood Creek immediately below Barrett Dam. Records of draft from Barrett Reservoir are not included, inasmuch as all releases are made to Dulzura Conduit, which transports water outside the basin. Leakage is mainly through the spillway gates.

EXTREMES: Maximum monthly discharge since 1937, 90,618 acre-feet (111,775,000 m3) March 1983. Prior to 1937, maximum monthly discharge 38,400 acre-feet (47,366,000 m3) February 1927; minimum, no flow during several months of various years.

Monthly Discharge in Acre-Feet

Month	Current Year 1989	Period 1937-1989		
		Average	Maximum	Minimum
January	0	190	6,048	0
February	0	1,786	70,318	0
March	0	3,426	90,618	0
April	0	1,953	36,820	0
May	0	827	22,933	0
June	0	377	10,947	0
July	0	140	4,306	0
August	0	95	3,410	0
September	0	8.6	298	0
October	0	3.7	123	0
November	0	79.0	4,135	0
December	0	122	4,911	0
Yearly	0	9,007	206,002	0
	Thousands of Cubic Meters			
	0	11,110	254,099	0

11-0120.00 COTTONWOOD CREEK ABOVE TECATE CREEK NEAR DULZURA, CALIFORNIA

DESCRIPTION: Water-stage recorder and cableway located 1.6 miles (2.6 km) upstream from the international land boundary between the United States and Mexico, 0.8 mile (1.3 km) upstream from the confluence with Tecate Creek, and 5.1 miles (8.2 km) south of Dulzura, California. Low water discharge measurements are made by wading at the gage; high water measurements are made from the cableway, which is located 700 feet (213 m) downstream from the gage. Zero of the gage is 569.40 feet (173.55 m) above mean sea level, U. S. C. & G. S. datum.
RECORDS: Based on a continuous record of gage heights and current meter measurements or observation of no flow. Records obtained and furnished by the U. S. Geological Survey. Records available: October 1936 through 1989.
REMARKS: Flow is largely controlled by Barrett and Morena Reservoirs, 10 (16.1 km) and 18 miles (29.0 km), respectively, upstream from this station.
EXTREMES: Maximum discharge 11,700 second-feet (331 m3/sec) February 21, 1980 (gage height 11.15 feet) (3.40 m). Minimum discharge, no flow during part of each year.

Mean Daily Discharge in Second-Feet 1989 —— Annual and Period Summary

Day	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	0.10	0.16	0.29	0.05	0	0	0	0	0	0	0	0
2	.08	.21	.34	.04	0	0	0	0	0	0	0	0
3	.09	.25	.59	.04	0	0	0	0	0	0	0	0
4	.15	1.3	.31	.02	0	0	0	0	0	0	0	0
5	.19	.99	.25	0	0	0	0	0	0	0	0	0
6	.29	.59	.24	0	0	0	0	0	0	0	0	0
7	.17	.39	.20	0	0	0	0	0	0	0	0	0
8	.15	.35	.18	0	0	0	0	0	0	0	0	0
9	.14	.66	.16	0	0	0	0	0	0	0	0	0
10	.14	.96	.16	0	0	0	0	0	0	0	0	0
11	.14	.66	.16	0	0	0	0	0	0	0	0	0
12	.11	.62	.15	0	0	0	0	0	0	0	0	0
13	.12	.72	.14	0	0	0	0	0	0	0	0	0
14	.13	.76	.13	0	0	0	0	0	0	0	0	0
15	.13	.63	.13	0	0	0	0	0	0	0	0	0
16	.13	.58	.13	0	0	0	0	0	0	0	0	0
17	.13	.54	.12	0	0	0	0	0	0	0	0	0
18	.13	.55	.10	0	0	0	0	0	0	0	0	0
19	.13	.57	.09	0	0	0	0	0	0	0	0	0
20	.13	.54	.08	0	0	0	0	0	0	0	0	0
21	.14	.46	.05	0	0	0	0	0	0	0	0	0
22	.15	.40	.02	0	0	0	0	0	0	0	0	0
23	.16	.38	.02	0	0	0	0	0	0	0	0	0
24	.21	.34	.04	0	0	0	0	0	0	0	0	0
25	.18	.32	.50	0	0	0	0	0	0	0	0	0
26	.15	.30	1.0	0	0	0	0	0	0	0	0	0
27	.15	.30	.23	0	0	0	0	0	0	0	0	0
28	.16	.30	.14	0	0	0	0	0	0	0	0	0
29	.16		.10	0	0	0	0	0	0	0	0	0
30	.15		.08	0	0	0	0	0	0	0	0	0
31	.15		.07		0		0	0		0		0
Sum	4.54	14.83	6.20	0.15	0	0	0	0	0	0	0	0

Month	Current Year 1989								Period 1937-1989		
	Extreme Gage Feet		ø Extreme Second-Feet				Average Second-Feet	Total Acre-Feet	Acre-Feet		
			High		Low				Average	Maximum	Minimum
	High	Low	Day		Day						
Jan.			6	0.29	2	0.08	0.15	9.0	490	11,918	0
Feb.			4	1.3	1	.16	.53	29.4	2,329	69,019	0
Mar.			26	1.0	22	.02	.20	12.3	3,747	88,707	0
Apr.			1	.05	5	0	.01	.3	2,248	40,240	0
May			! 1	0	! 1	0	0	0	811	18,192	0
June			! 1	0	! 1	0	0	0	268	5,919	0
July			! 1	0	! 1	0	0	0	71.9	2,918	0
Aug.			! 1	0	! 1	0	0	0	56.5	1,500	0
Sept.			! 1	0	! 1	0	0	0	14.3	645	0
Oct.			! 1	0	! 1	0	0	0	7.7	236	0
Nov.			! 1	0	! 1	0	0	0	41.8	1,117	0
Dec.			! 1	0	! 1	0	0	0	166	2,569	0
				1.3		0	0.07	51.0	10,251	178,808	0
Yearly	Meters		Cubic Meters per Second					Thousands of Cubic Meters			
				0.04		0	0	62.9	12,644	220,556	0

ø Mean daily ! And other days

11-0125.00 CAMPO CREEK NEAR CAMPO, CALIFORNIA

DESCRIPTION: Water-stage recorder and broad-crested weir on left bank, 0.5 mile (0.8 km) upstream from the international land boundary between the United States and Mexico, just upstream from the bridge on California State Highway 94, 3.5 miles (5.6 km) southwest of Campo, California. Zero of gage is 2,178.92 feet (664.13 m) above mean sea level, U. S. C. & G. S. datum.

RECORDS: Based on current meter measurements and observation of no flow. Records obtained and furnished by the U. S. Geological Survey. Records available: October 1936 through 1989.

REMARKS: Campo Creek originates in the United States and flows southwestward into Mexico where it joins Tecate Creek. The flow at this station was partially regulated by a small conservation reservoir, 1 mile (1.6 km) upstream, from August 1956 to February 20, 1980, when it was destroyed by a flood.

EXTREMES: Maximum discharge, 895 second-feet (25.3 m3/sec), March 24, 1983 (gage height 5.39 feet (1.64 m) present datum), from rating curve extended above 110 second-feet 3.12 m3/sec) on basis of velocity-depth relation and cross section area at the control. Minimum discharge, no flow during part of most years.

Mean Daily Discharge in Second-Feet 1989 —— Annual and Period Summary

Day	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	0.26	* 0.25	0.32	0.71	0.32	0.15	0.10	0	0	0	0.06	0.23
2	.25	* .30	.35	.70	.31	.17	.07	0	0	0	.06	.23
3	* .25	* .27	.42	.69	.28	.18	.04	0	0	0	.06	.23
4	.37	* .50	.41	.65	.26	.19	.02	0	0	0	.06	.24
5	.31	* .35	.39	.59	.23	.19	.02	0	0	0	.07	.24
6	.39	* .30	.40	.55	.19	.19	.01	0	0	0	.08	.26
7	* .31	* .27	.41	.53	.14	.20	.01	0	0	0	.09	.27
8	* .29	* .27	.40	.50	.13	.22	0	0	0	0	.09	.24
9	.28	* .30	.39	.49	.17	.21	0	0	0	0	.07	.22
10	.27	* .40	.38	.48	.20	.20	0	0	0	0	.07	.22
11	.26	* .30	.39	.48	.26	.19	0	0	0	0	.08	.22
12	.25	* .27	.41	.47	.24	.18	0	0	0	0	.08	.22
13	.25	* .28	.40	.45	.26	.16	0	0	0	0	.09	.24
14	.25	.30	.41	.41	.27	.14	0	0	0	0	.10	.23
15	.25	.27	.42	.40	.28	.11	0	0	0	0	.09	.25
16	.24	.27	.41	.37	.25	.10	0	0	0	.01	.10	.26
17	.24	.27	.42	.36	.23	.09	0	0	0	.02	.10	.27
18	* .24	.26	.42	.34	.20	.07	0	0	0	.02	.10	.27
19	* .24	.27	.42	.32	.17	.06	0	0	0	.01	.11	.25
20	* .24	.27	.40	.28	.15	.05	0	0	0	.03	.12	.25
21	* .24	.25	.38	.26	.13	.04	0	0	0	.06	.14	.25
22	* .24	.30	.39	.28	.12	.03	0	0	0	.07	.16	.22
23	* .24	.31	.41	.28	.12	.04	0	0	0	.07	.17	.21
24	* .30	.30	.42	.31	.13	.08	0	0	0	.07	.20	.19
25	* .25	.30	.69	.32	.14	.10	0	0	0	.09	.22	.20
26	* .25	.30	2.4	.42	.14	.09	0	0	0	.08	.24	.21
27	* .25	.31	2.9	.36	.14	.06	0	0	0	.07	.23	.22
28	* .25	.32	1.8	.34	.14	.05	0	0	0	.07	.20	.24
29	* .25		.89	.33	.15	.05	0	0	0	.06	.20	.26
30	* .25		.79	.33	.15	.10	0	0	0	.06	.21	.24
31	* .25		.74		.15		0	0		.06		.22
Sum	8.21	8.36	19.78	13.00	6.05	3.69	0.27	0	0	0.85	3.65	7.30

Current Year 1989 — **Period 1937-1989**

Month	Extreme Gage Feet High	Extreme Gage Feet Low	Extreme Second-Feet High Day	Extreme Second-Feet High	Extreme Second-Feet Low Day	Extreme Second-Feet Low	Average Second-Feet	Total Acre-Feet	Acre-Feet Average	Acre-Feet Maximum	Acre-Feet Minimum
Jan.			6	0.39	! 16	0.24	0.26	16.3	186	1,087	0
Feb.			4	.50	21	.25	.30	16.6	369	4,287	0
Mar.			27	2.9	1	.32	.64	39.2	614	9,394	0
Apr.			1	.71	21	.26	.43	25.8	419	7,204	0
May			1	.32	! 22	.12	.20	12.0	198	3,207	0
June			8	.22	22	.03	.12	7.3	94.3	1,811	0
July			1	.10	! 8	0	.01	.5	55.2	1,236	0
Aug.			! 1	0	! 1	0	0	0	56.5	1,628	0
Sept.			! 1	0	! 1	0	0	0	41.0	984	0
Oct.			25	.09	! 1	0	.03	1.7	49.2	879	0
Nov.			26	.24	! 1	.06	.12	7.2	94.5	1,234	0
Dec.			! 7	.27	24	.19	.24	14.5	152	1,583	0
				2.9		0	0.19	141	2,329	31,325	0
Yearly	Meters		Cubic Meters per Second					Thousands of Cubic Meters			
				0.08		0	0.01	174	2,873	38,639	0

ø Mean daily ! And other days * Estimated

11-0130.00 COTTONWOOD CREEK NEAR INTERNATIONAL BOUNDARY

DESCRIPTION: Water-stage recorder and cableway, 0.6 mile (1.0 km) upstream from the international land boundary between the United States and Mexico, 0.5 mile (0.8 km) downstream from the confluence of Cottonwood Creek and Tecate Creek, and 5.5 miles (8.9 km) south of Dulzura, California. This station is published by the U. S. Geological Survey under the name "Tijuana River near Dulzura, California." Low water discharge measurements are made by wading at the gage. The zero of the gage is 542.42 feet (165.33 m) above mean sea level, U. S. C. & G. S. datum.
RECORDS: Based on a continuous record of gage heights and current meter measurements or observation of no flow. Records obtained and furnished by the U. S. Geological Survey. Records available: October 1936 through 1989.
REMARKS: Flow is partially controlled by Barrett and Morena Reservoirs, 11 (17.7 km) and 19 miles (30.6 km), respectively, upstream from this station. The flow at this station represents the amount of water passing the Marron Dam site.
EXTREMES: Maximum discharge, 13,600 second-feet (385 m3/sec), March 3, 1983 (gage height 7.03 feet); (2.14 m); maximum gage height, 11.19 feet (3.41 m) February 18, 1980; minimum discharge, no flow for part of most years.

Mean Daily Discharge in Second-Feet 1989 —— Annual and Period Summary

Day	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	* 4.0	3.3	2.0	* 3.0	2.7	1.3	1.0	0.93	0.99	* 2.8	* 1.9	2.2
2	* 4.0	4.8	3.0	6.0	1.8	1.9	.87	1.1	1.2	* 2.5	* 1.9	1.8
3	* 3.5	6.0	8.4	* 5.5	2.2	1.4	.74	1.1	1.1	* 2.3	* 1.9	2.3
4	* 3.5	14	5.4	* 3.0	1.3	1.1	.89	1.1	1.1	* 2.1	* 1.9	1.9
5	* 4.5	19	3.7	* 3.5	.99	1.1	.94	1.3	1.2	* 2.0	* 1.9	2.7
6	9.7	4.6	2.3	* 4.0	1.1	1.3	1.0	1.2	1.1	* 1.8	* 1.9	3.0
7	5.2	2.5	2.5	* 3.0	1.9	1.5	.95	1.2	1.1	* 1.8	* 1.9	2.9
8	4.5	3.6	3.1	* 2.5	1.6	1.5	.95	1.2	1.3	* 1.8	* 1.9	2.5
9	3.0	5.8	2.6	* 4.0	3.0	1.8	1.1	1.2	1.2	* 1.8	* 1.9	1.9
10	6.1	6.7	2.7	* 3.5	2.9	1.2	1.0	1.3	1.1	* 1.8	* 1.9	3.2
11	5.4	3.8	3.6	* 3.5	3.2	1.3	1.1	1.1	1.1	* 1.8	* 1.9	2.2
12	4.1	4.0	2.9	* 3.0	2.0	1.1	.95	1.5	1.4	* 1.8	* 1.9	2.7
13	5.4	3.7	1.9	* 2.5	3.7	1.1	.82	1.2	1.4	* 1.8	* 1.9	1.7
14	* 5.1	4.2	2.3	* 2.0	4.5	1.1	.78	1.1	1.2	* 1.8	* 1.9	1.6
15	* 4.8	3.2	1.8	* 3.5	6.0	1.3	.71	1.4	1.2	* 1.8	* 1.9	* 1.9
16	* 5.2	3.1	2.9	* 3.0	6.6	1.5	.61	1.5	1.2	* 1.8	* 1.9	* 2.1
17	* 4.5	3.5	1.3	* 2.5	3.0	1.1	.59	1.5	1.1	* 1.8	* 1.9	* 2.1
18	* 4.0	3.0	1.1	* 2.5	3.6	1.2	.60	1.4	1.2	* 1.8	* 1.9	* 2.1
19	2.4	2.9	1.1	* 3.0	2.2	.89	.62	1.2	2.1	* 1.9	* 2.0	* 2.1
20	2.9	3.0	1.0	* 2.5	3.6	1.0	.65	1.1	3.3	* 1.9	* 2.0	* 2.1
21	2.5	3.0	.91	2.9	5.0	.96	.71	.96	4.6	* 2.5	* 2.0	* 2.1
22	4.4	1.9	1.1	3.6	1.7	.94	.77	1.3	3.7	* 1.8	2.0	* 2.2
23	1.7	2.5	3.1	2.9	3.1	.92	.85	1.6	3.2	* 1.8	2.3	* 2.2
24	2.0	1.7	3.9	2.6	4.4	.96	.89	1.6	3.1	* 1.8	1.7	* 2.2
25	2.1	2.4	7.6	3.4	* 3.0	.86	1.0	1.8	2.4	* 1.8	2.3	* 2.2
26	2.5	2.3	27	4.3	* 1.5	.75	1.4	1.7	2.5	* 1.8	2.8	* 2.2
27	3.0	1.8	8.3	2.2	* 2.0	.90	1.3	1.3	2.2	* 1.8	1.3	* 2.2
28	2.7	1.8	3.7	2.7	* 3.0	1.1	1.4	1.2	2.3	* 1.8	2.0	* 2.6
29	5.5		2.5	3.7	* 3.5	1.3	1.2	1.3	2.6	* 1.8	2.3	* 2.4
30	4.2		4.3	4.2	* 3.0	1.2	1.1	1.3	3.3	* 1.8	2.5	* 2.2
31	4.2		* 3.5		* 2.0		.80	1.3		* 1.8		* 2.2
Sum	126.6	122.1	121.51	98.5	90.09	35.58	28.29	39.99	56.49	59.4	59.4	69.7

Month	Current Year 1989 Extreme Gage Feet High	Extreme Gage Feet Low	ø Extreme Second-Feet High Day	High	Low Day	Low	Average Second-Feet	Total Acre-Feet	Period 1937-1989 Acre-Feet Average	Maximum	Minimum
Jan.			6	9.7	23	1.7	4.1	251	1,017	20,792	0
Feb.			5	19	24	1.7	4.4	242	4,367	143,486	0
Mar.			26	27	21	.91	3.9	241	6,518	133,180	0
Apr.			2	6.0	14	2.0 *	3.3	195	3,110	51,060	0
May			16	6.6	5	.99	2.9	179	1,058	20,955	0
June			2	1.9	26	.75	1.2	70.6	373	8,428	0
July			26	1.4	17	.59	.91	56.1	152	3,497	0
Aug.			25	1.8	1	.93	1.3	79.3	154	5,494	0
Sept.			21	4.6 *	1	.99 *	1.9	112	49.5	1,144	0
Oct.			1	2.8 *	6	1.8 *	1.9	118	79.5	1,626	0
Nov.			26	2.8	27	1.3	2.0	118	198	3,568	0
Dec.			10	3.2	14	1.6,	2.2	138	558	5,839	0
Yearly				27		0.59	2.5	1,800	17,634	288,517	0
	Meters			Cubic Meters per Second				Thousands of Cubic Meters			
				0.76		0.02	0.07	2,220	21,751	355,880	0

ø Mean daily ! And other days * Estimated

11-0131.00 INFLOWS TO RODRIGUEZ RESERVOIR, BAJA CALIFORNIA

DESCRIPTION: Rodriguez Dam is located in Mexico on Rio de las Palmas, the principal tributary to the Tijuana River, about 5.6 miles (9.0 km) upstream from its confluence with Cottonwood Creek, 10.6 miles (17.0 km) upstream from the point where the Tijuana River crosses the international boundary between the United States and Mexico, and 9.9 miles (16.0 km) southeast of Tijuana, Baja California.

RECORDS: Computed from monthly reservoir records of storage, releases, spills, leakage, evaporation, and rainfall. Records obtained by the Ministry of Agriculture and Hydraulic Resources through May 1961; from June 1961 through March 1966 by the Junta de Agua Potable y Alcantarillado del Distrito Urbano de Tijuana, Baja California, and from April 1966 by the State of Baja California Commission of Public Services for Tijuana. Records furnished by the Mexican Section of the Commission. Records available: May 1937 through 1989. Storage began in Rodriguez Reservoir on September 22, 1936.

REMARKS: Records of runoff represent all water reaching Rodriguez Reservoir, including rainfall on the reservoir water surface. Area-capacity-elevation rating for reservoir used in the computations is dated 1927 when the reservoir area was initially surveyed. Elevation of crest of spillway 380.08 feet (115.85 m) above mean sea level; at top of spillway gates 410.10 feet (125.00 m) above mean sea level. Reservoir capacity at spillway crest 74,885 acre-feet (92,370,000 m3); at top of spillway gates 111,880 acre-feet (138,000,000 m3).

EXTREMES: Maximum monthly inflow, 157,453 acre-feet (194,216,000 m3); February 1980; minimum, no flow during part of most years.

MONTHLY DISCHARGE IN ACRE-FEET

Month	Current Year 1989	Period 1938-1989		
		Average	Maximum	Minimum
January	88.4	2,093	54,820	0
February	72.7	5,878	157,453	5.8
March	63.6	9,996	139,893	4.2
April	18.6	3,141	77,790	0
May	0	618	11,460	0
June	0	200	4,661	0
July	0	95.7	1,464	0
August	0	62.0	770	0
September	2.2	64.6	466	0
October	1.9	79.9	350	0
November	21.5	167	1,940	0
December	50.4	879	15,686	8.4
Yearly	319	23,275	309,298	254
	Thousands of Cubic Meters			
	394	28,709	381,515	313

11-0132.00 DIVERSIONS FROM RODRIGUEZ RESERVOIR, BAJA CALIFORNIA

DESCRIPTION: Sparling flow meter located immediately below the dam in the pipeline which carries water from Rodriguez Reservoir to Gate No. 1 (Poblado Presa) and to Gate No. 2 (City Aqueduct). Formerly, water for irrigation was also diverted to the North and South Canals.

RECORDS: Direct recording by Sparling flow meter. Records through May 1961 were obtained by the Ministry of Agriculture and Hydraulic Resources; from June 1961 to March 1966 by the Junta de Agua Potable y Alcantarillado del Distrito Urbano de Tijuana; and from April 1966 through 1989 by the State of Baja California Commission of Public Services for Tijuana. Records furnished by the Mexican Section of the Commission. Records available: May 1937 through 1989.

REMARKS: Beginning in January 1937, diversions for irrigation began from both sides for the Tijuana valley and for domestic use at the village by Rodriguez Dam and the city of Tijuana. Since February 1960, no water has been released for irrigation of farmlands.

EXTREMES: Maximum monthly diversion, 1,963 acre-feet (2,421,000 m3), July 1944; minimum, no flow on several occasions since March 1941.

MONTHLY DISCHARGE IN ACRE-FEET

Month	Current Year 1989	Period 1937-1989		
		Average	Maximum	Minimum
January	0	375	1,596	0
February	0	376	1,429	0
March	0	435	1,613	0
April	0	526	1,602	0
May	0	654	1,676	0
June	0	722	1,857	0
July	0	762	1,963	0
August	0	705	1,859	0
September	0	606	1,527	0
October	0	539	1,618	0
November	0	452	1,563	0
December	0	422	1,596	0
Yearly	0	6,576	18,319	0
	Thousands of Cubic Meters			
	0	8,112	22,596	0

11-0133.00 TIJUANA RIVER AT INTERNATIONAL BOUNDARY

DESCRIPTION: Water-stage recorder on top of north levee about 0.7 mile (1.1 km) downstream (north) from boundary, 1.1 miles (1.8 km) upstream from the new Dairy Mart Road bridge,and 1.4 miles (2.3 km) west of the international gate at San Ysidro, California. Zero of the gage is at mean sea level, U. S. C. & G. S. datum.
RECORDS: Based on current meter measurements, staff gage readings and record of gage heights. Records obtained and furnished by the United States Section of the Commission. Records available: May 1947 through 1989.
EXTREMES: Since May 1947: Maximum instantaneous discharge, 33,100 second-feet (937 m3/sec), February 21, 1980; minimum discharge, no flow during many years since 1951.

Mean Daily Discharge in Second-Feet 1989 —— Annual and Period Summary

Day	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	12.7	15.0	12.6	14.9	13.2	9.3	12.7	14.3	19.1	14.9	15.3	18.2
2	12.7	18.0	13.0	13.0	14.2	8.7	10.9	13.0	18.4	15.4	14.5	18.7
3	10.5	21.4	17.5	13.0	13.3	8.6	13.9	13.7	17.5	16.6	14.6	18.8
4	13.6	31.7	13.7	11.9	13.7	8.9	13.1	12.8	17.2	16.5	15.0	17.7
5	17.7	25.1	14.0	10.7	13.2	9.6	10.3	11.5	17.5	17.7	16.6	17.8
6	32.9	22.3	14.1	10.1	14.0	9.2	9.4	12.7	18.4	17.6	17.6	17.1
7	17.7	19.5	14.6	8.9	14.1	8.5	13.5	11.6	19.0	16.2	17.8	17.3
8	18.4	18.2	13.9	8.9	12.4	9.8	12.7	12.2	17.8	10.0	15.2	17.0
9	15.7	30.6	13.4	9.2	12.6	8.9	14.9	12.9	17.3	9.7	13.8	15.2
10	15.1	21.9	11.9	8.7	17.4	8.8	16.0	12.8	16.5	10.6	14.9	14.6
11	14.1	17.5	12.0	8.4	19.0	8.8	11.7	15.0	16.9	12.5	15.0	15.3
12	15.4	14.5	13.0	10.0	17.8	8.9	12.5	13.9	14.0	15.0	14.4	14.6
13	14.9	21.9	13.1	10.2	17.6	8.7	11.7	12.0	12.3	14.0	15.1	15.0
14	15.3	19.6	12.8	10.2	16.3	9.6	11.6	11.1	12.3	11.5	16.7	14.1
15	15.3	18.7	13.2	10.2	17.1	7.9	11.1	13.4	12.7	13.6	18.0	12.2
16	14.3	18.4	13.2	10.4	16.3	11.9	11.0	13.3	11.8	11.4	19.3	12.0
17	14.9	17.7	12.9	9.8	14.4	9.5	10.3	14.6	13.7	13.0	20.9	12.0
18	14.3	18.3	12.3	10.8	12.1	8.4	11.0	16.4	13.5	14.1	19.1	13.2
19	15.3	17.3	11.8	9.5	11.2	8.6	11.2	16.6	19.3	18.7	19.7	11.9
20	15.1	17.2	13.0	9.3	11.1	11.4	10.3	18.5	15.7	19.4	18.8	12.4
21	16.2	17.5	12.8	9.4	12.6	17.0	11.8	17.0	12.5	23.1	16.5	12.2
22	13.9	15.9	13.8	8.7	13.0	15.0	12.8	17.2	11.5	20.2	18.1	13.4
23	12.7	15.5	12.0	9.8	12.5	10.0	12.4	18.2	10.5	17.7	15.3	14.4
24	15.0	15.2	9.7	10.8	12.4	10.2	12.7	18.8	13.0	22.4	15.3	15.4
25	13.3	14.6	217	10.8	9.9	9.9	13.1	19.1	15.0	29.7	16.6	17.0
26	15.4	13.8	110	10.8	8.3	11.7	12.3	19.7	14.9	21.5	16.0	19.3
27	15.4	12.9	19.2	10.8	8.0	9.4	12.1	17.5	16.3	29.7	14.1	17.0
28	15.3	12.7	15.4	11.7	7.7	10.4	12.3	16.8	15.8	27.0	15.2	151
29	15.0		15.5	11.1	6.9	11.6	13.3	17.8	14.8	33.7	16.4	28.6
30	15.0		15.9	12.2	10.3	19.5	14.0	18.4	12.8	23.8	16.4	18.1
31	14.3		14.5		8.7		14.4	19.2		16.3		20.7
Sum	477.4	522.9	721.8	314.2	401.3	308.7	381.0	472.0	458.0	553.5	492.2	632.2

Current Year 1989									Period 1947-1989		
Month	Extreme Gage Feet		Extreme Second-Feet				Average Second-Feet	Total Acre-Feet	Acre-Feet		
			High		Low				Average	Maximum	Minimum
	High	Low	Day	High	Day	Low					
Jan.	40.03	39.19	6	186	! 1	12.7	15.4	947	2,829	72,441	0
Feb.	39.81	39.23	4	103	!27	12.7	18.7	1,037	9,143	315,328	0
Mar.	41.83	39.16	25	1,740	24	5.8	23.3	1,432	12,220	293,494	0
Apr.	39.28	39.17	3	18.4	11	6.5	10.5	623	3,238	62,938	0
May	39.31	39.14	10	25.2	29	5.8	12.9	796	1,765	42,599	0
June	39.30	39.14	!22	23.7	!19	6.5	10.3	612	500	9,696	0
July	39.26	39.15	5	19.7	6	8.1	12.3	756	374	9,242	0
Aug.	39.38	39.17	11	36.4	7	9.8	15.2	936	526	17,092	0
Sept.	39.49	39.20	19	54.0	!20	9.8	15.3	908	132	978	0
Oct.	39.78	39.18	25	91.0	! 9	8.1	17.9	1,098	212	2,713	0
Nov.	39.31	39.17	7	29.7	! 9	12.7	16.4	976	448	4,377	0
Dec.	41.12	39.16	28	967	19	8.1	20.4	1,254	776	6,705	0
	41.83	39.14		1,740		5.8	15.7	11,375	32,163	595,739	0
Yearly	Meters		Cubic Meters per Second						Thousands of Cubic Meters		
	12.75	11.93		49.3		0.16	0.44	14,031	39,672	734,832	0

! And other days

STORED WATER IN RESERVOIRS, TIJUANA RIVER BASIN

Data are presented below for all storage reservoirs in the Tijuana River Basin. The data represent contents on the last day of the month in acre-feet. The reservoir capacities indicated are total capacities at the top of the spillway gates in closed position on the controlled spillways of Barrett and Rodriguez Dams, and at spillway level for Morena Dam, which has had an uncontrolled spillway since the spillway gates were removed in 1942. The records of storage reported below for Morena, Barrett, and Rodriguez Reservoirs are based on the capacities as determined by the following surveys: Morena 1948; Barrett 1948, 1951, and 1955; and Rodriguez 1927, when the reservoir area was initially surveyed.

Records for Morena and Barrett Reservoirs are obtained and furnished by the city of San Diego and the U. S. Geological Survey. Records for Rodriguez Reservoir obtained and furnished by the State of Baja California Commission of Public Services for Tijuana.

	MORENA RESERVOIR, CALIFORNIA (Capacity 50,210)		BARRETT RESERVOIR, CALIFORNIA (Capacity 44,760)		RODRIGUEZ RESERVOIR, BAJA CALIFORNIA (Capacity 111,880)		TOTAL IN TIJUANA RIVER BASIN RESERVOIRS (Capacity 206,850)	
Month	1989	Average 1937-1989	1989	Average 1937-1989	1989	Average 1937-1989	1989	Average 1937-1989
Jan.	26,180	18,989	20,406	13,674	3,922	32,723	50,508	65,386
Feb.	24,616	20,010	7,577	14,654	3,949	33,961	36,142	68,625
Mar.	24,325	21,145	7,642	16,454	3,931	37,919	35,898	75,518
Apr.	21,125	21,199	9,607	16,929	3,852	38,060	34,584	76,188
May	17,500	20,963	11,610	16,494	3,711	37,557	32,821	75,014
June	13,924	20,413	14,134	15,777	3,595	36,477	31,653	72,667
July	10,767	19,859	15,206	15,014	3,454	35,079	29,427	69,952
Aug.	10,514	19,379	13,537	14,231	3,312	33,712	27,363	67,322
Sept.	10,200	18,861	11,668	13,750	3,224	32,760	25,092	65,371
Oct.	10,002	18,552	10,006	13,283	3,154	31,722	23,162	63,557
Nov.	9,807	18,449	9,144	12,936	3,097	31,417	22,048	62,802
Dec.	9,631	18,587	7,797	13,201	3,076	31,692	20,504	63,480
Average	15,716	19,701	11,528	14,700	3,523	34,424	30,767	68,825
Maximum	26,180	!# 61,670	20,406	!* 45,920	3,949	! 112,272	50,508	! 213,600
Minimum	9,631	!! 10	7,577	!! 106	3,076	!! 0	20,504	!! 1,264

\# March 31, 1941 - Prior to removal of spillway gates
* April 30, 1937 - Sandbags were placed on crest of spillway
! Maximum end of month storage for period of record
!! Minimum end of month storage for period of record

RAINFALL ON THE TIJUANA RIVER WATERSHED

IN INCHES

Tabulated below are monthly records of rainfall with averages for their periods of record at stations located in California and Baja California. Daily records, where available, are on file in the offices of the United States and Mexican Sections of the Commission. For location, elevation, period of record, and the observer, see alphabetical listing of these stations following rainfall data.

IN THE UNITED STATES

Month	Morena Dam, California		Barrett Dam, California		Marron Valley, California		Sawday Ranch, California		Campo, California	
	1989	Average 1906-1989	1989	Average 1907-1989	1989	Average 1951-1989	1989	Average 1950-1989	1989	Average 1900-1989
Jan.	1.00	3.69	3.53	3.38	1.40	2.73	0.74	3.25	1.05	2.97
Feb.	1.60	3.69	2.30	3.37	4.00	2.16	1.36	2.93	1.18	3.18
Mar.	2.40	3.46	1.20	3.14	1.70	2.78	1.84	3.25	1.65	2.79
Apr.	.10	1.66	.60	1.52	0	1.20	.22	1.51	.21	1.37
May	.20	.59	.80	.54	0	.33	.16	.40	.13	.48
June	0	.12	.67	.07	0	.05	0	.04	0	.07
July	0	.38	.02	.13	#	.04	0	.57	0	.50
Aug.	0	.55	0	.23	#	.13	0	.78	0	.54
Sept.	.20	.40	.02	.26	#	.27	.11	.47	.17	.35
Oct.	.50	.90	.06	.72	#	.42	.25	.60	.36	.66
Nov.	.10	1.62	1.31	1.51	#	1.46	.05	1.83	.03	1.41
Dec.	.20	3.13	2.61	2.83	#	2.32	.28	2.47	.29	2.44
Yearly	6.30	20.19	13.12	17.70	-	13.89	5.01	18.10	5.07	16.76

Month	Chula Vista, California		Lower Otay Dam, California		Brown Field, California	
	1989	Average 1930-1989	1989	Average 1906-1989	1989	Average 1964-1989
Jan.	0.48	1.77	0.36	2.00	0.47	1.61
Feb.	.89	1.70	.84	1.53	1.52	1.54
Mar.	.63	1.68	1.13	2.12	1.03	2.03
Apr.	.05	.82	.15	1.06	.02	1.00
May	.10	.22	.03	.41	0	.19
June	T	.04	0	.07	0	.06
July	0	.02	0	.04	0	.04
Aug.	0	.09	0	.12	0	.11
Sept.	#	.19	.31	.24	.27	.19
Oct.	.42	.38	.32	.39	.30	.42
Nov.	#	1.20	.04	1.37	.10	1.57
Dec.	.37	1.62	.33	1.57	.60	1.73
Yearly	-	9.73	3.51	10.92	4.31	10.49

IN MEXICO

Month	La Rumorosa, Baja California		Valle Redondo, Baja California		Tecate, Baja California		Rodríguez Dam, Baja California		Valle de las Palmas, Baja California	
	1989	Average 1945-1989	1989	Average 1971-1989	1989	Average 1946-1959 1961-1989	1989	Average 1938-1989	1989	Average 1948-1989
Jan.	0.94	0.98	0.51	2.13	0.83	2.60	0.31	1.54	0.31	1.61
Feb.	1.69	.63	.75	2.24	1.65	1.89	.47	1.42	.28	1.22
Mar.	1.50	.79	1.50	2.40	1.73	2.44	1.10	1.61	.67	1.46
Apr.	.12	.39	#	.91	.28	1.10	.08	.75	T	.59
May	.16	.08	0	.24	.12	.28	0	.12	T	.12
June	0	.04	0	.04	0	.08	0	.04	0	.04
July	0	.39	0	.08	0	.16	0	.04	0	.08
Aug.	#	.71	#	.16	0	.24	0	.12	0	.20
Sept.	#	#	#	#	.16	.16	.16	.24	.12	.24
Oct.	#	#	#	#	.31	.47	.12	.39	.31	.35
Nov.	#	#	#	#	.12	1.46	0	1.02	0	.87
Dec.	#	#	#	#	.24	2.05	.24	1.54	.24	1.14
Yearly	-	-	-	-	5.43	13.66	2.48	8.78	1.93	7.72

* Estimated # Missing record T Trace

RAINFALL ON THE TIJUANA RIVER WATERSHED

IN INCHES

IN MEXICO

Month	P. B. Rosarito, Baja California		El Pinal, Baja California		El Hongo, Baja California		El Carrizo, Baja California		Belen, Baja California	
	1989	Average 1967-1989	1989	Average 1964-1989	1989	Average 1980-1989	1989	Average 1980-1989	1989	Average 1965-1989
Jan.	#	1.73	1.22	2.87	0.59	1.54	.35	1.54	.94 *	2.32
Feb.	#	1.81	1.34	3.31	.94	1.93	.35	1.85	.94 *	2.56
Mar.	#	1.65	1.81	3.54	1.34	2.60	.79	2.32	.91	2.72
Apr.	#	.79	.20	1.65	.08	.79	T	.79	.08	1.10
May	#	.24	.08	.35	.08	.16	0	.16	.08	.16
June	#	.04	0	.04	0	.04	#	#	0	.08
July	#	.04	0	.75	0	.75	#	.16	0	.16
Aug.	#	.08	0	.87	.12	1.14	0	.16	0	.28
Sept.	#	.20	.24	.71	.08	.28	#	#	.16	.39
Oct.	#	.43	T	.63	#	#	#	#	.16	.67
Nov.	#	1.26	.16	2.01	0	1.73	T	1.73	.16	1.69
Dec.	#	1.34	.24	2.83	.12	1.30	.39	1.81	.08	2.01
Yearly	-	9.92	5.28	19.61	-	-	-	-	3.50	14.49

* Estimated # Missing record T Trace

LOCATION OF RAINFALL STATIONS ON THE TIJUANA RIVER WATERSHED

The precipitation records of the stations listed alphabetically below began on the date shown and extend through 1989.

IN THE UNITED STATES

NAME OF STATION	LATITUDE	LONGITUDE	ELEV. (FT.)	RECORD BEGAN	OBSERVER
Barrett Dam, California	32° 41'	116° 40'	1,623	1907	City of San Diego
Brown Field, California	32° 34'	116° 59'	515	1964	City of San Diego
Campo, California	32° 38'	116° 28'	2,630	1877	County of San Diego
Chula Vista, California	32° 36'	117° 06'	9	1930	Chula Vista Fire Department
Lower Otay Dam, California	32° 37'	116° 56'	540	1906	City of San Diego
Marron Valley, California	32° 34'	116° 46'	550	1951	County of San Diego
Morena Dam, California	32° 41'	116° 31'	3,075	1906	City of San Diego
Sawday Ranch, California	32° 45'	116° 29'	3,200	1950	William Tulloch

IN MEXICO

NAME OF STATION	LATITUDE-	LONGITUDE	ELEV. (FT.)	RECORD BEGAN	OBSERVER
Belen, Baja California	32° 12'	116° 29'	1,821	1965	** S. A. R. H.
El Carrizo, Baja California	32° 29'	116° 42'	1,624	1980	S. A. R. H.
El Hongo, Baja California	32° 31'	116° 18'	3,150	1980	S. A. R. H.
El Pinal, Baja California	32° 11'	116° 17'	" 4,429	1964	S. A. R. H.
La Rumorosa, Baja California	32° 33'	116° 03'	4,042	1945	S. A. R. H.
P. B. Rosarito, Baja California	32° 19'	117° 02'	72	1967	S. A. R. H.
Rodriguez Dam, Baja California	32° 27'	116° 54'	394	1938	S. A. R. H.
Tecate, Baja California	32° 33'	116° 41'	1,575	1946	S. A. R. H.
Valle de Las Palmas, Baja California	32° 22'	116° 37'	919	1948	S. A. R. H.
Valle Redondo, Baja California	32° 31'	116° 45'	794	1971	S. A. R. H.

Elevation above mean sea level
" Estimated from topographic maps
** Ministry of Agriculture and Hydraulic Resources

EVAPORATION IN THE TIJUANA RIVER BASIN

IN INCHES

Tabulated below are records of evaporation observed at three stations in California and at four stations in Baja California, with averages for their periods of record. The stations in California are observed by Western Salt Company, city of San Diego, California, and the United States Section of the Commission; those in Baja California are observed by the Ministry of Agriculture and Hydraulic Resources of Mexico. For specific location of these stations, refer to data opposite same station name shown in "Location of Rainfall Stations," in this bulletin.

Types of pans used:

1. Barrett Reservoir: January 1921 through September 1926, square 3-foot by 3-foot by 18-inch deep floating pan. October 1926 through 1989, square 3-foot by 3-foot by 18-inch deep land pan set 15 inches in ground.

2. Morena Reservoir: October 1915 through December 1921, square 3-foot by 3-foot by 18-inch deep floating pan. January 1922 through August 1926 records are the average of evaporation in a square 3-foot by 3-foot by 18-inch deep floating pan and a land pan of the same dimensions. September 1926 through 1989, square 3-foot by 3-foot by 18-inch deep land pan set 15 inches in ground.

3. Lower Otay Dam: January 1950 through 1989, square 3-foot by 3-foot by 18-inch deep land pan set 15 inches in ground.

IN THE UNITED STATES

Month	Morena Dam, California		Barrett Dam, California		Lower Otay Dam, California			
	1989	Average 1916-1989	1989	Average 1921-1989	1989	Average 1950-1989		
Jan.	2.32	2.12	1.46	1.88	2.08	1.92		
Feb.	1.76	2.13	1.53	2.16	2.45	2.27		
Mar.	1.59	3.28	3.14	3.35	3.81	3.36		
Apr.	5.15	4.65	4.16	4.68	5.72	4.64		
May	6.09	6.51	4.58	6.59	5.57	6.11		
June	9.16	8.38	6.38	8.11	5.86	6.94		
July	10.85	9.63	7.22	9.59	6.87	8.37		
Aug.	9.62	8.91	6.28	8.99	7.03	7.86		
Sept.	7.97	7.09	5.49	7.33	5.59	6.43		
Oct.	4.75	4.94	3.63	5.14	4.42	4.63		
Nov.	4.25	3.21	2.83	3.19	3.80	2.81		
Dec.	4.02	2.32	2.09	1.99	3.02	2.13		
Yearly	67.53	63.17	48.79	63.00	56.22	57.47		

IN MEXICO

Month	Rodriguez Dam, Baja California		Valle de las Palmas Baja California		El Carrizo, Baja California			
	1989	Average 1939-1942 1946-1989	1989	Average 1952-1989	1989	Average 1980-1989		
Jan.	3.15	4.21	3.70	3.27	5.87	5.04		
Feb.	2.60	4.37	3.27	3.23	5.20	4.65		
Mar.	4.49	4.57	4.61	4.29	7.32	5.91		
Apr.	5.75	5.59	#	5.39	9.69	7.68		
May	5.75	5.08	#	#	10.24	8.74		
June	6.30	7.60	#	#	#	#		
July	7.60	8.62	#	#	13.15	11.46		
Aug.	6.77	7.91	#	#	11.02	10.87		
Sept.	5.55	6.65	#	#	#	#		
Oct.	4.17	5.51	#	#	#	#		
Nov.	4.33	4.41	#	#	8.74	5.71		
Dec.	3.82	3.46	#	#	8.58	4.61		
Yearly	60.28	68.35	-	-	-	-		

Missing record

TEMPERATURE IN THE TIJUANA RIVER BASIN

IN DEGREES FAHRENHEIT

The maximum, minimum, and monthly average temperature observations for United States stations are from daily readings of thermometers generally exposed in a shelter located a few feet above sod-covered ground. The maximum and minimum temperatures shown for the stations in Mexico are from daily maximum and minimum thermometer observations, with maximum and minimum for their periods of record. For specific location, elevation, period of record, and the observer, refer to data opposite same station name as shown in "Location of Rainfall Stations," page 71 in this bulletin.

IN THE UNITED STATES

Month	Barrett Dam, California				Campo, California				Chula Vista, California			
	1989			Average 1931-1989	1989			Average 1951-1989	1989			Average 1931-1989
	Mean	Max.	Min.		Mean	Max.	Min.		Mean	Max.	Min.	
Jan.	52.5	79	26	49.1	55.0	67	43	47.6	44.9	59	31	53.2
Feb.	57.0	84	30	50.9	47.7	62	33	48.5	56.6	66	47	54.6
Mar.	57.5	83	32	53.3	54.0	72	36	49.9	59.2	68	50	55.8
Apr.	68.5	97	40	57.8	60.0	80	40	53.7	65.6	74	57	58.5
May	64.5	90	39	62.7	63.4	70	57	58.9	63.4	70	57	60.9
June	77.0	104	50	68.7	65.7	87	44	65.3	65.8	71	60	63.5
July	79.5	109	50	76.1	73.7	96	52	73.1	69.8	76	64	67.3
Aug.	72.0	95	49	76.2	69.6	91	48	73.0	71.2	77	66	68.9
Sept.	73.5	102	45	72.3	68.9	91	47	68.7	*	*	*	67.6
Oct.	64.5	92	37	64.2	60.6	79	42	60.7	66.8	75	58	63.4
Nov.	61.0	88	34	55.8	54.2	74	35	52.5	*	*	*	58.4
Dec.	41.0	55	27	50.4	50.0	67	33	47.9	59.3	72	46	54.6
Yearly	64.0	109	26	61.5	60.2	96	33	58.3	-	-	-	60.6

IN MEXICO

Month	La Rumorosa, Baja California				Tecate, Baja California				Rodriguez Dam, Baja California			
	1989		1945-1989		1989		1946-1989		1989		1938-1989	
	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.
Jan.	64	23	81	5	77	25	100	16	82	34	90	27
Feb.	82	18	82	10	86	28	100	18	86	36	93	32
Mar.	82	37	88	16	86	30	97	23	93	37	100	32
Apr.	86	36	91	23	102	36	102	28	104	46	104	36
May	91	39	97	27	91	39	108	36	84	50	100	37
June	99	41	113	34	104	41	108	32	95	52	108	46
July	106	54	106	39	111	45	115	36	95	54	104	46
Aug.	95	50	102	46	97	43	117	34	91	54	106	50
Sept.	*	*	*	*	100	41	115	36	95	50	109	46
Oct.	*	*	*	*	93	36	106	27	93	45	108	34
Nov.	*	*	*	*	90	36	97	27	88	43	99	30
Dec.	*	*	*	*	84	30	97	23	86	36	93	27
Yearly	*	*	*	*	111	25	117	16	104	34	109	27

Month	Valle de las Palmas, Baja California				P. B. Rosarito, Baja California				El Pinal, Baja California			
	1989		1948-1989		1989		1967-1989		1989		1964-1989	
	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.
Jan.	81	25	91	12	*	*	93	36	73	21	77	3
Feb.	90	28	99	23	*	*	90	36	73	21	81	14
Mar.	93	32	100	28	*	*	90	34	73	28	84	19
Apr.	106	37	106	28	*	*	88	36	82	27	84	18
May	93	43	111	36	*	*	104	43	82	37	91	25
June	109	45	118	39	*	*	104	43	109	41	109	25
July	104	48	120	45	*	*	90	50	90	48	102	32
Aug.	100	48	118	41	*	*	93	50	90	43	104	32
Sept.	109	45	117	39	*	*	108	48	90	41	102	25
Oct.	99	36	109	32	*	*	100	43	86	32	95	23
Nov.	91	34	100	19	*	*	97	32	72	32	88	14
Dec.	86	30	95	21	*	*	90	36	81	27	81	10
Yearly	109	25	120	12	-	-	108	32	109	21	109	3

* Missing data

TEMPERATURE IN THE TIJUANA RIVER BASIN

IN DEGREES FAHRENHEIT

IN MEXICO

	Valle Redondo, Baja California				El Hongo, Baja California				El Carrizo, Baja California			
	1989		1974-1989		1989		1981-1989		1989		1980-1989	
Month	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.
Jan.	88	23	90	21	68	25	77	16	82	34	86	30
Feb.	91	32	95	23	81	21	81	21	93	37	93	28
Mar.	90	32	90	27	84	34	84	28	88	45	90	36
Apr.	102	48	102	32	88	34	88	30	106	46	106	39
May	82	46	106	39	93	37	100	34	95	50	108	41
June	95	52	113	41	102	45	102	36	*	*	*	*
July	99	52	111	48	108	55	108	45	104	54	109	52
Aug.	100	52	113	46	90	37	106	37	113	52	113	52
Sept.	*	*	*	*	100	39	100	37	*	*	*	*
Oct.	*	*	*	*	*	*	*	*	*	*	*	*
Nov.	*	*	*	*	79	36	79	28	90	46	95	39
Dec.	*	*	*	*	81	34	84	18	90	39	90	27
Yearly	-	-	-	-	-	-	-	-	-	-	-	-

	Belen, Baja California			
	1989		1965-1989	
Month	Max.	Min.	Max.	Min.
Jan.	*	*	93	21
Feb.	90	30	90	21
Mar.	90	41	97	25
Apr.	104	45	104	27
May	97	48	104	32
June	108	50	109	37
July	109	50	113	39
Aug.	102	50	113	41
Sept.	106	41	111	34
Oct.	95	36	104	21
Nov.	84	30	93	25
Dec.	84	25	91	19
Yearly	109	25	113	19

* Missing data

DRAINAGE AREAS ABOVE GAGING STATIONS AND IRRIGATED AREAS ALONG TIJUANA RIVER AND TRIBUTARIES

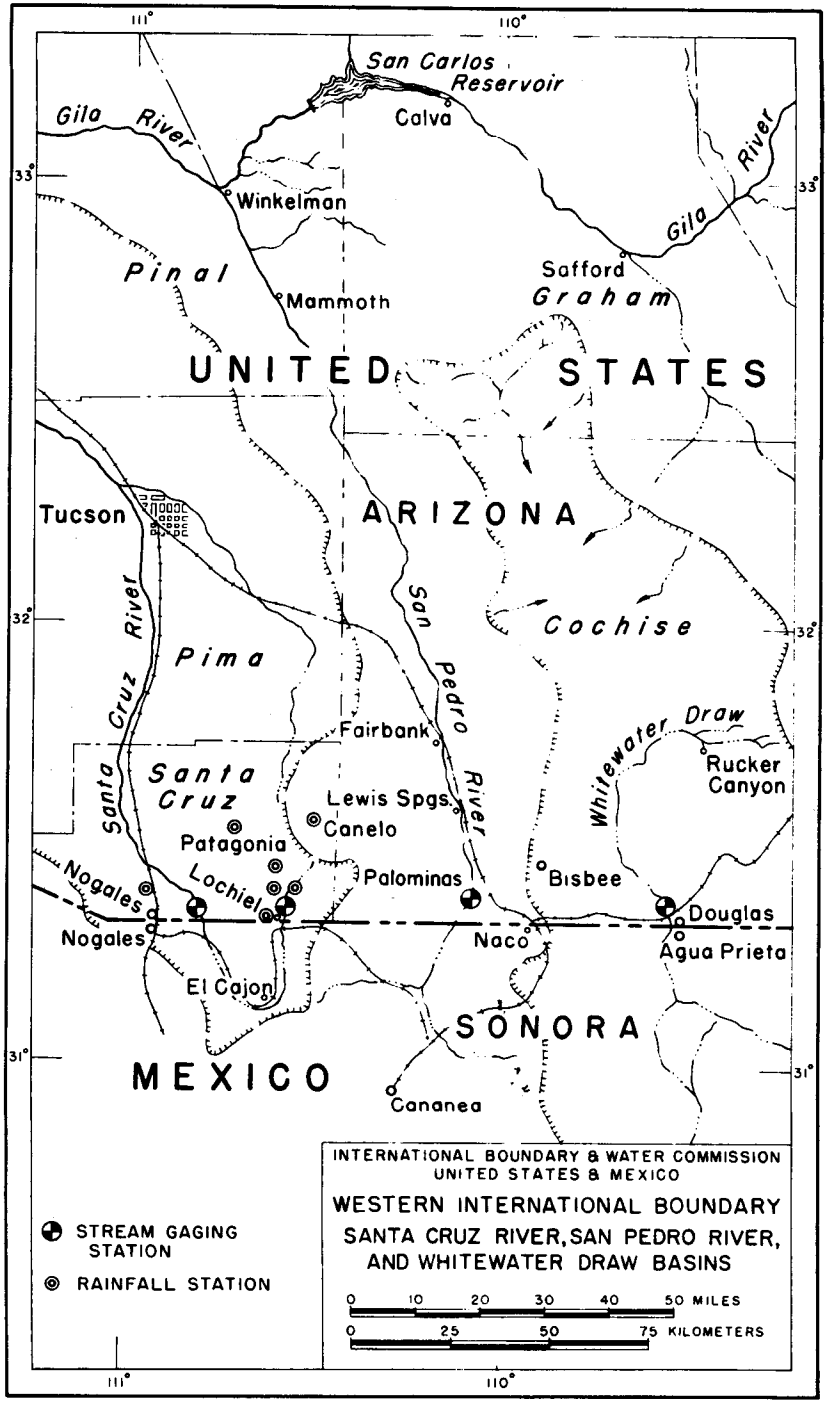
1989

The total area within the Tijuana River basin is 1,731 square miles, as determined from the best available maps from both the United States and Mexico. The drainage areas shown below are tabulated according to their downstream sequence.

The irrigated areas, tabulated in downstream sequence, are from the most reliable sources available. Those in the United States were furnished by the Tijuana River Valley Association or estimated from aerial photographs. Those in Mexico were furnished by the Ministry of Agriculture and Hydraulic Resources of Mexico through the Mexican Section of the Commission. All irrigation in the Tijuana River basin in 1989 was by pumping from ground water.

Designation of Areas	Drainage Basin-Square Miles			Irrigated Areas-Acres		
	United States	Mexico	Total	United States	Mexico	Total
Cottonwood Creek above Morena Dam	114	0	114	0	0	0
Morena Dam to Barrett Dam	133	0	133	0	0	0
above Barrett Dam	245	0	245	0	0	0
below Barrett Dam and above Tecate Creek	65	0	65	0	0	0
above Tecate Creek	312	0	312	0	0	0
Campo Creek above International Boundary	85	4	89	0	0	0
Tecate Creek above International Boundary (not including Campo Creek)	19	64	83	0	0	0
Cottonwood Creek above International Boundary Station	413	68	481	0	0	0
Rio de las Palmas above Rodriguez Dam	7	981	988	0	(b) 0	0
Tijuana River above Nestor Gaging Station	458	1,266	1,724			
above the Mouth	462	1,269	1,731	(a) 458	0	458

(a) Data from Otay Water District, leased areas from IBWC irrigation and private landowners.
(b) There was no irrigation in 1989 in the Tijuana Irrigation District, Tijuana Valley, Baja California Mexico, from the Rodriguez Reservoir.


111°
110°
San Carlos Reservoir
Gila River
Calva
Winkelman
Gila River
33°
Pinal
Mammoth
Safford
Graham
UNITED STATES
Tucson
ARIZONA
32°
Santa Cruz River
San Pedro River
Cochise
Pima
Fairbank
Whitewater Draw
Rucker Canyon
Santa Cruz
Lewis Spgs.
Canelo
Patagonia
Nogales
Lochiel
Palominas
Bisbee
Douglas
Nogales
Naco
Agua Prieta
El Cajon
SONORA
31°
MEXICO
Cananea
INTERNATIONAL BOUNDARY & WATER COMMISSION
UNITED STATES & MEXICO
WESTERN INTERNATIONAL BOUNDARY
SANTA CRUZ RIVER, SAN PEDRO RIVER,
AND WHITEWATER DRAW BASINS
STREAM GAGING STATION
RAINFALL STATION
0 10 20 30 40 50 MILES
0 25 50 75 KILOMETERS

09-5375.00 WHITEWATER DRAW NEAR DOUGLAS, ARIZONA

DESCRIPTION: Water-stage recorder located on U. S. Highway 80 bridge between Douglas and Bisbee, Arizona, about 450 feet (137 m) upstream from the Southern Pacific Railroad bridge, 1.5 miles (2.4 km) upstream from the international boundary, and 2 miles (3.2 km) west of Douglas, Arizona. Zero of gage is 3,909.14 feet (1,191.51 m) above mean sea level, U. S. C. & G. S. datum of 1929. Location April 26, 1972 to April 10, 1974 was 200 feet (61.0 m) upstream from bridge. Datum 4.40 feet (1.34 m) higher.

RECORDS: Based on current meter measurements, observations of no flow, and a continuous record of gage heights. Computations by shifting control methods. Records obtained and furnished by the U. S. Section of the Commission. Records fair. Records available: August to October 1911 (gage heights and discharge measurements only), July to October 1912, January to June 1913, October 1913, December 1913 to June 1914, February to June 1915, October 1915 to September 1919,October 1919 to April 1922 (gage heights and discharge measurements only), July 1930 to December 1933, May 1935 to July 1947, October 1947 through 1989 (July 1954 to March 1955, monthly discharge only).

REMARKS: Diversions above this station are mainly by pumping from ground water for irrigation. Records show flow at the international boundary into Mexico except for some smelter waste water entering the stream a short distance below this station.

EXTREMES: Prior to 1936: Maximum recorded discharge, 3,450 second-feet (97.7 m3/sec) August 10, 1931 (gage height 12.15 feet (3.70 m); maximum estimated discharge, 4,050 second-feet (115 m3/sec) July 27, 1919; minimum discharge, no flow for several days of many years. Since 1936: Maximum discharge, 5,060 second-feet (143 m3/sec) August 7, 1955; maximum gage height, 16.55 feet (5.04 m) July 29, 1966; minimum daily discharge, no flow at times during most years.

Mean Daily Discharge in Second-Feet 1989 —— Annual and Period Summary

Day	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	0	0	# 0	0	0	0	0	" 1.0	0.7	0	0	0
2	0	0	0	0	# 0	0	0	* 0	0	0	0	0
3	0	0	0	0	0	0	0	* 1.0	0	0	0	0
4	0	0	0	0	0	0	0	" 10.4	0	0	0	0
5	4.5	0	0	0	0	0	0	" 1.2	0	0	0	0
6	.2	0	0	0	0	0	0	" .2	0	0	0	0
7	0	0	0	0	0	0	0	" .1	0	0	0	0
8	0	0	0	0	0	0	0	* .1	0	0	0	0
9	0	0	0	0	0	0	0	0	0	0	0	0
10	0	0	0	0	0	0	0	0	0	0	0	0
11	0	0	0	0	0	0	0	0	0	0	0	0
12	0	0	0	0	0	0	0	0	0	0	0	0
13	0	0	0	0	0	0	0	0	0	0	0	0
14	0	0	0	0	0	0	0	0	0	0	0	0
15	0	0	0	0	0	0	0	0	0	0	0	0
16	0	0	0	0	0	0	0	" 1.7	0	0	0	0
17	0	0	0	0	0	0	0	" .1	0	0	0	0
18	0	0	0	0	0	0	0	* 0	0	0	0	0
19	0	0	0	0	0	0	0	* .6	0	0	0	0
20	0	0	0	0	0	0	0	3.7	0	0	0	0
21	0	0	0	0	0	0	0	8.4	0	0	0	0
22	0	0	0	0	0	0	0	.2	0	0	0	0
23	0	0	0	0	0	0	2.3	* .2	0	0	0	0
24	0	0	0	0	0	0	8.5	0	0	0	0	0
25	0	0	0	0	0	0	27.9	0	0	0	0	0
26	0	0	0	0	0	0	23.8	0	0	0	0	0
27	0	0	0	0	0	0	.3	0	0	0	0	0
28	# 0	0	0	0	0	0	# 0	0	# 0	0	0	0
29	0		0	0	# 0	0	0	0	0	0	0	0
30	0		0	0	# 0	0	" .2	0	0	0	# 0	0
31	0		# 0		0		0	# 1.3		# 0		0
Sum	4.7	0	0	0	0	0	63.0	30.2	0.7	0	0	0

Current Year 1989								Period 1936-1989		
Month	Extreme Gage Feet		Extreme Second-Feet			Average Second-Feet	Total Acre-Feet	Acre-Feet		
			High		Low			Average	Maximum	Minimum
	High	Low	Day		Day					
Jan.	6.08	4.86	5	11.6	! 1	0	0.2	9.3	33.5	451	0
Feb.	4.86	4.86		0		0	0	0	16.9	132	0
Mar.	4.86	4.86		0		0	0	0	23.4	295	0
Apr.	4.86	4.86		0		0	0	0	17.2	173	0
May	4.86	4.86		0		0	0	0	11.7	138	0
June	4.86	4.86		0		0	0	0	112	1,590	0
July	6.88	4.86	25	42.4	! 1	0	2.0	125	1,748	8,110	0
Aug.	6.35	4.86	21	19.4	! 1	0	1.0	59.9	2,843	14,480	0
Sept.	5.89	4.86	1	7.6	! 1	0	0	1.4	741	3,170	0
Oct.	4.86	4.86		0		0	0	0	350	6,103	0
Nov.	4.86	4.86		0		0	0	0	31.7	352	0
Dec.	4.86	4.86		0		0	0	0	110	2,363	0
Yearly	6.88	4.86		42.4		0	0.3	196	6,038	22,321	196
	Meters		Cubic Meters per Second					Thousands of Cubic Meters			
	2.10	1.48		1.20		0	0.01	242	7,448	27,533	242

! And other days " Estimated * Partly estimated
Measurement or observation of zero flow

SEWAGE INFLUENT, DOUGLAS, ARIZONA
INTERNATIONAL TREATMENT PLANT

DESCRIPTION: Parshall flume in the influent line of the older trickling filter unit and a Parshall flume in the influent line of the newer extended aeration unit. The treatment plant is located about one mile (1.6 km) west of the Douglas-Agua Prieta Port of Entry immediately adjacent to the international boundary in Douglas, Cochise County, Arizona.

RECORDS: Continuous monthly records since March 1948; daily records from March 18, 1948 through 1950 and from January 1952 through 1989.

REMARKS: The older 1.3 mgd trickling filter unit was constructed in 1947 by the International Boundary and Water Commission. Since April 8, 1968 all sewage from Agua Prieta has been retained in Mexico to be used for irrigation along with the effluent from the Douglas International Treatment Plant. On July 1, 1973, ownership and operation of the plant was transferred from the International Boundary and Water Commission to the city of Douglas. In 1980 the plant was enlarged, with the addition of the extended aeration unit bringing the total capacity up to 2.6 mgd. The effluent from the Douglas Treatment Plant is discharged through a closed conduit to Mexico.

	Total Monthly Flows			Mean Daily Flows-Millions of Gallons Per Day					
	Millions of Gallons			Current Year 1989			Period 1952-1989		
Month	U.S.	Mexico	Total	Maximum	Minimum	Mean	Maximum	Minimum	Mean
Jan.	41.981	0	41.981	1.530	1.162	1.354	2.157	0.416	1.111
Feb.	38.057	0	38.057	1.872	.847	1.359	1.872	.543	1.114
Mar.	41.586	0	41.586	1.653	.994	1.342	1.932	.590	1.115
Apr.	40.435	0	40.435	1.563	1.163	1.348	2.047	.380	1.116
May	42.236	0	42.236	1.644	1.196	1.362	1.850	.510	1.120
June	40.532	0	40.532	1.939	.770	1.351	2.060	.555	1.169
July	41.907	0	41.907	1.935	1.122	1.352	3.209	.483	1.216
Aug.	41.859	0	41.859	1.635	1.068	1.350	2.681	.365	1.231
Sept.	40.574	0	40.574	1.690	1.021	1.352	2.107	.470	1.190
Oct.	41.667	0	41.667	1.479	1.064	1.344	2.154	.603	1.155
Nov.	40.274	0	40.274	1.766	.942	1.342	2.390	.320	1.136
Dec.	41.786	0	41.786	1.447	1.230	1.348	3.330	.500	1.134
Yearly	492.894	0	492.894	1.939	0.770	1.350	3.330	0.320	1.151

09-4705.00 SAN PEDRO RIVER AT PALOMINAS, ARIZONA

DESCRIPTION: Water-stage recorder located near left bank on downstream side of the bridge pier at Highway 92, 0.7 mile (1.1 km) east of Palominas, 2.5 miles (4.0 km) upstream from Green Brush Draw, 4.5 miles (7.2 km) downstream from international boundary, and 12 miles (19 km) southwest of Bisbee, Arizona. Zero of gage is 4,187.62 feet (1,276.39 m) above mean sea level (State Highway bench mark).

RECORDS: Based on current meter measurements, observations of no flow, and a continuous record of gage heights. Records available: May 1930 to October 1933, May 1935 to July 1941, and July 1950 through 1989. Records obtained and furnished by U. S. Geological Survey to September 30, 1981; thereafter by the United States Section of the Commission.

REMARKS: There are some small diversions for irrigation of a few hundred acres above this station, mostly in Mexico. Record shows approximate flow of river at international boundary.

EXTREMES: Maximum daily discharge, 22,000 second-feet (623 m3/sec) on August 14, 1940 (gage height 16.16 feet (4.93 m) present datum), from rating curve extended above 5,600 second-feet (159 m3/sec) on basis of slope-area measurement of peak flow; no flow at times in most years. Greatest flood known occurred on September 28, 1926 (gage height, about 23.9 feet (7.28 m) present datum, from flood marks; discharge not determined.

Mean Daily Discharge in Second-Feet 1989 —— Annual and Period Summary

Day	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	7.1	9.4	# 5.7	1.7	0	0	0	4.9	1.8	0	0	0.3
2	6.6	9.7	5.1	1.4	# 0	0	0	0	1.2	0	0	.3
3	5.5	8.5	5.3	1.2	0	0	0	7.7	2.7	0	0	.3
4	26.6	8.9	5.5	1.0	0	0	0	141	56.0	0	0	.3
5	50.6	9.2	4.7	1.3	0	0	0	339	* 9.2	0	0	.3
6	25.6	9.9	5.0	.9	0	0	0	278	" 2.8	0	0	.3
7	24.6	10.3	4.9	.9	0	0	0	53.2	" 1.5	.1	0	.3
8	20.2	10.3	4.6	.8	0	0	0	* 11.7	" .3	.1	0	.3
9	18.6	9.6	4.0	.3	0	0	0	" 4.8	" 0	0	0	.3
10	17.8	9.2	3.9	.1	0	0	0	* 19.5	" 0	0	.3	.3
11	16.5	9.2	3.7	0	0	0	0	* 35.0	" 0	0	1.0	.6
12	14.8	9.8	4.4	0	0	0	0	* 47.3	" 0	0	.9	.7
13	13.5	9.9	4.6	0	0	0	0	* 55.9	" 0	0	.8	.9
14	13.0	9.1	4.6	0	0	0	0	129	" 0	0	.9	.7
15	13.5	8.4	4.9	0	0	0	0	54.6	" 0	0	.8	.7
16	13.8	8.2	5.8	0	0	0	0	* 30.7	" 0	0	.9	.9
17	12.5	7.9	3.9	0	0	0	0	* 68.0	" 0	0	.9	1.1
18	11.6	7.6	4.0	0	0	0	0	" 12.4	" 0	0	.8	1.1
19	10.9	7.2	4.4	0	0	0	0	* 20.6	" 0	0	.7	1.2
20	9.9	7.3	4.3	0	0	0	0	*172	" 0	0	.8	1.2
21	9.9	7.4	4.4	0	0	0	0	* 58.6	0	0	1.1	1.3
22	9.9	6.2	4.6	0	0	0	0	" 28.3	0	0	.8	1.3
23	9.6	6.0	4.1	0	0	0	0	" 9.4	0	0	.8	1.5
24	9.4	6.4	4.1	0	0	0	0	" 1.1	0	0	.8	1.7
25	9.1	6.5	4.8	0	0	0	0	" .4	0	0	.5	1.5
26	9.1	7.3	5.3	0	0	0	40.9	" .3	0	0	.5	1.6
27	8.7	6.9	6.6	0	0	0	6.3	" .2	0	0	.3	1.8
28	8.5	7.1	7.2	0	0	0	# 0	" .3	# 0	0	.3	2.2
29	8.2		4.7	0	0	# 0	6.7	" .1	0	0	.3	2.5
30	8.7		3.4	0	# 0	0	0	" .1	0	0	# .3	1.9
31	9.1		# 2.4		0		3.4	# .4		# 0		1.5
Sum	433.4	233.4	144.9	9.6	0	0	57.3	1,584.5	75.5	0.2	14.5	30.9

Current Year 1989									Period 1951-1989		
Month	Extreme Gage Feet		Extreme Second-Feet				Average Second-Feet	Total Acre-Feet	Acre-Feet		
	High	Low	High Day	High	Low Day	Low			Average	Maximum	Minimum
Jan.	3.77	2.89	4	120	3	4.7	14.0	860	1,541	27,763	2.6
Feb.	2.98	2.87	13	12.1	22	4.7	8.3	463	792	6,764	3.0
Mar.	2.99	2.82	28	9.4	31	1.2	4.7	287	702	7,401	13.3
Apr.	2.88	2.74	2	3.1	! 8	0	.3	19.0	178	1,039	0
May	2.74	2.74		0		0	0	0	64.7	407	0
June	2.74	2.74		0		0	0	0	142	1,391	0
July	4.28	2.65	26	243	! 1	0	1.8	114	5,132	17,238	0
Aug.	7.05	2.65	4	1,590	! 1	0	51.1	3,143	8,303	36,369	165
Sept.	3.94	2.71	4	155	! 8	0	2.5	150	1,947	16,344	11.3
Oct.	2.74	2.65	! 7	.5	! 1	0	0	.4	1,947	47,322	0
Nov.	2.81	2.65	21	1.5	! 1	0	.5	28.8	273	2,563	0
Dec.	2.93	2.79	13	3.9	! 1	.3	1.0	61.3	1,676	25,479	6.2
Yearly	7.05	2.65		1,590		0	7.1	5,127	22,698	62,788	4,400
	Meters		Cubic Meters per Second					Thousands of Cubic Meters			
	2.15	0.81		45.0		0	0.20	6,324	27,998	77,448	5,427

\# Measurement or observation of zero flow ! And other days " Estimated

* Partly estimated

09-4800.00 SANTA CRUZ RIVER NEAR LOCHIEL, ARIZONA

DESCRIPTION: Water-stage recorder located in the United States near left bank on the downstream side of concrete bridge pier of county highway bridge, 2.5 miles (4.0 km) northeast of Lochiel, Arizona, and 1.7 miles (2.7 km) upstream from the international land boundary. The elevation of the zero of the gage has not been determined, but topographic maps indicate the elevation of the stream bed at the gage is about 4,620 feet (1,408 m).
RECORDS: Based on current meter measurements, observations of no flow, and a continuous record of gage heights. Records obtained and furnished by the U. S. Geological Survey. Records available: January 1949 through 1989.
REMARKS: There are small diversions by ground water pumping for irrigating about 200 acres (80.9 ha) above this station.
EXTREMES: Maximum discharge, 12,800 second-feet (362 m3/sec) on August 15, 1984 (gage height 10.47 feet) (3.19 m); minimum discharge, no flow for several days of many years.

Mean Daily Discharge in Second-Feet 1989 —— Annual and Period Summary

Day	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	1.2	1.4	0.98	0.89	0.64	" .26	0.26	0.17	0.48	0.66	0.89	0.83
2	1.2	1.4	.95	.89	.61	" .25	.27	.17	.49	.67	.89	.80
3	1.2	1.4	.86	.89	.64	" .24	.29	2.8	.49	.69	.89	.80
4	2.1	1.4	.79	.89	.68	" .23	.30	39	.49	1.3	.89	.79
5	1.4	1.4	.85	.89	.69	" .21	.33	1.1	.49	32	.89	.82
6	1.4	1.3	.91	.89	.69	" .19	.38	.64	12	1.7	.89	.89
7	1.4	1.2	.82	.89	.69	" .18	.40	.53	1.7	.96	.89	.89
8	1.4	1.2	.78	.88	.69	" .17	.70	.41	.76	.89	.89	.89
9	1.3	1.2	.78	.83	.63	" .15	.68	.38	.68	.87	.89	.89
10	1.3	1.2	.87	.78	.63	" .14	.47	.38	.64	.86	.86	.89
11	1.3	1.2	.89	.74	.65	" .13	.46	.40	.62	.86	.84	.88
12	1.3	1.2	.93	.67	.65	" .12	.44	.38	.67	.83	.84	.87
13	1.3	1.2	.99	.66	.65	" .11	.44	4.4	.67	.79	.84	.88
14	1.3	1.2	.99	.68	.65	" .10	.44	1.4	.63	.81	.84	.89
15	1.3	1.1	1.0	.71	.67	" .09	.44	.53	.63	.84	.84	.89
16	1.3	1.2	1.0	.72	.73	" .08	.43	.51	.65	.85	.84	.89
17	1.3	1.1	1.0	.69	.64	" .07	11	.52	.70	.83	.83	.89
18	1.4	1.1	1.0	.49	.45	" .06	1.1	.49	.71	.86	.79	.93
19	1.4	1.2	.97	.40	.46	" .05	.37	.47	.63	.86	.79	.94
20	1.4	1.2	.94	.35	.48	" .04	.28	.45	.63	.92	.80	.94
21	1.4	1.1	.94	.33	.37	" .03	.22	.44	.64	.94	.79	.94
22	1.4	1.1	.95	.41	.27	" .02	.22	.43	.62	.94	.79	.94
23	1.4	1.1	.98	.48	.36	.01	.94	.42	.60	.93	.80	.94
24	1.4	1.1	.95	.55	" .35	0	.45	.42	.57	.94	.84	.94
25	1.4	1.1	.94	.54	" .34	0	.19	.41	.55	.94	.84	.94
26	1.4	1.0	1.0	.56	" .33	0	.20	.41	.55	.94	.84	.94
27	1.4	1.0	1.0	.57	" .32	0	.19	.41	.57	.89	.84	.94
28	1.4	.98	.97	.57	" .31	.01	.18	.41	.56	.89	.84	.94
29	1.4		.94	.58	" .30	.13	.17	.57	.53	.89	.84	.98
30	1.4		.89	.61	" .29	.21	.17	.51	.54	.89	.84	.98
31	1.4		.89		" .27		.17	.47		.89		1.0
Sum	42.6	33.28	28.75	20.03	16.13	3.28	22.58	60.03	30.49	59.13	25.38	27.97

Current Year 1989 — **Period** 1949-1989

Month	Extreme Gage Feet		Ø Extreme Second-Feet				Average Second-Feet	Total Acre-Feet	Acre-Feet		
	High	Low	High Day	High	Low Day	Low			Average	Maximum	Minimum
Jan.			4	2.1	! 1	1.2	1.4	84.5	161	2,895	1.3
Feb.			! 1	1.4	28	.98	1.2	66.0	92.9	1,000	1.8
Mar.			!15	1.0	! 8	.78	.93	57.0	113	2,103	.7
Apr.			! 1	.89	21	.33	.67	39.7	43.4	308	0
May			16	.73	31	" .27	.52	32.0	23.6	170	0
June			1	" .26	!24	0	.11	6.5	17.4	169	0
July			17	11	!29	.17	.73	44.8	508	4,270	1.6
Aug.			4	39	! 1	.17	1.9	119	1,058	11,518	.1
Sept.			6	12	1	.48	1.0	60.5	324	2,634	0
Oct.			5	32	1	.66	1.9	117	317	4,732	0
Nov.			! 1	.89	!18	.79	.85	50.3	64.0	403	0
Dec.			31	1.0	4	.79	.90	55.5	113	1,093	0
Yearly				39		0	1.0	733	2,835	17,376	126
	Meters		Cubic Meters per Second					Thousands of Cubic Meters			
				1.10		0	0.03	904	3,497	21,433	155

Ø Mean daily ! And other days " Estimated

09-4805.00 SANTA CRUZ RIVER NEAR NOGALES, ARIZONA

DESCRIPTION: Water-stage recorder, cable with sit-down cable car located 5.5 miles (8.9 km) east of Nogales, Arizona, 0.8 mile (1.3 km) downstream from the international boundary and 6 miles (9.7 km) upstream from the Santa Cruz bridge on State Highway No. 82. Zero of gage is 3,702.54 feet (1,128.53 m) above mean sea level, U. S. C. & G. S. datum (levels by International Boundary and Water Commission).

RECORDS: Based on current meter measurements, observations of no flow, and a continuous record of gage heights. Records obtained and furnished by the U. S. Geological Survey. Records available: March to November 1907 and April 1909 to December 1912 (discharge measurements and fragmentary gage height record); January 1913 to June 1922 (October 1915 to September 1916, monthly discharges only); May 1930 to December 1933; and July 1935 through 1989.

REMARKS: Diversions in both countries affect the flow at this station. The major diversions occur in Mexico for domestic and irrigation uses. There are no storage dams above the station as of December 1989.

EXTREMES: Maximum discharge, 33,500 second-feet (949 m3/sec) on October 9, 1977 (gage height 15.5 feet) (4.72 m); minimum discharge, no flow for several days of many years.

Mean Daily Discharge in Second-Feet 1989 —— Annual and Period Summary

Day	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	5.2	3.9	3.5	" 1.5	0.74	0.26	0	0	0	0	" 3.8	1.2
2	5.2	3.9	3.5	" 1.5	.74	.23	0	0	0	0	" 3.9	1.2
3	5.2	3.9	3.5	" 1.5	.72	.13	0	0	.37	0	" 3.7	1.3
4	30	3.9	3.5	" 1.5	.73	.20	0	27	0	0	" 3.5	1.2
5	9.7	3.9	3.5	" 1.5	.64	.09	0	30	0	1,480	" 3.3	1.1
6	8.4	3.9	3.5	1.5	.59	.15	0	6.2	0	199	" 3.1	1.2
7	7.5	3.9	3.5	1.3	.66	.03	0	.22	0	59	" 2.9	1.2
8	6.5	3.9	3.5	1.3	.55	.06	.05	.11	0	22	" 2.7	1.2
9	6.2	3.9	3.5	1.2	.54	.04	0	0	0	13	" 2.6	1.2
10	6.4	3.9	3.5	1.1	.55	.01	0	44	0	11	" 2.4	1.2
11	5.8	3.9	3.4	.89	.52	0	0	36	0	11	" 2.2	1.1
12	6.0	3.9	3.0	1.1	.66	0	0	.78	0	10	" 2.0	1.2
13	6.0	3.9	3.0	1.2	.55	0	0	.13	0	9.6	" 1.9	1.2
14	5.8	3.9	3.0	1.1	.52	0	0	0	0	9.2	" 1.7	1.2
15	5.2	3.9	3.0	.88	.51	0	0	0	0	" 9.3	" 1.6	1.2
16	4.8	3.9	3.0	.96	.57	0	0	87	0	" 9.1	" 1.5	1.2
17	4.3	3.9	3.0	.85	.58	0	0	23	0	" 8.2	" 1.3	1.2
18	4.3	3.9	3.0	.96	.47	0	0	.62	0	" 7.7	" 1.2	1.1
19	4.6	3.9	3.0	.81	.40	0	0	.07	0	" 7.3	" 1.2	1.1
20	4.3	3.9	3.0	.73	.35	0	0	0	0	" 7.0	" 1.2	1.1
21	4.3	3.9	3.5	.68	.36	0	0	0	0	" 6.6	" 1.2	1.1
22	4.3	3.9	3.6	.77	.32	0	0	0	0	" 6.4	" 1.2	1.1
23	4.3	3.9	3.8	.84	.25	0	0	0	0	" 6.5	" 1.2	1.1
24	4.3	3.9	3.8	.83	.27	0	0	0	0	" 6.1	" 1.2	1.1
25	3.9	3.9	3.8	.83	.29	0	0	0	0	" 5.8	" 1.2	1.2
26	3.9	3.9	22	.89	.27	0	0	0	0	" 5.5	" 1.2	1.2
27	3.9	3.9	" 5.6	.99	.30	0	0	0	0	" 5.1	" 1.2	1.2
28	3.9	3.9	" 1.5	1.1	.26	0	0	0	0	" 4.9	" 1.2	1.3
29	3.9		" 1.5	.96	.25	0	0	0	0	" 4.6	" 1.2	1.2
30	3.9		" 1.5	.80	.26	0	0	0	0	" 4.3	" 1.2	1.2
31	3.9		" 1.5		.27		0	0		" 4.1		1.3
Sum	185.9	109.2	117.5	32.07	14.69	1.20	0.05	255.13	0.37	1,932.3	59.7	36.6

Current Year 1989 — **Period** 1936-1989

Month	Extreme Gage Feet		ø Extreme Second-Feet				Average Second-Feet	Total Acre-Feet	Acre-Feet		
			High		Low						
	High	Low	Day		Day				Average	Maximum	Minimum
Jan.			4	30	!25	3.9	6.0	369	2,122	30,282	0
Feb.			! 1	3.9	! 1	3.9	3.9	217	1,689	20,547	0
Mar.			26	22	!28	" 1.5	3.8	233	1,440	19,575	0
Apr.			! 1	" 1.5	21	.68	1.1	63.6	387	2,955	0
May			! 1	.74	29	.25	.47	29.1	117	1,031	0
June			1	.26	!11	0	.04	2.4	86.2	1,449	0
July			8	.05	! 1	0	0	.1	2,684	15,610	.1
Aug.			16	87	! 1	0	8.2	506	5,636	45,790	91.0
Sept.			3	.37	! 1	0	.01	.7	1,541	9,431	0
Oct.			5	1,480	! 1	0	62	3,833	1,959	59,025	0
Nov.			! 2	" 3.9	!18	" 1.2	2.0	118	539	7,384	0
Dec.			! 3	1.3	! 5	1.1	1.2	72.6	2,505	33,568	0
				1,480		0	7.5	5,445	20,705	87,615	2,234
Yearly	Meters		Cubic Meters per Second					Thousands of Cubic Meters			
				41.9		0	0.21	6,716	25,539	108,071	2,756

ø Mean daily ! And other days " Estimated

SEWAGE INFLUENT, NOGALES INTERNATIONAL TREATMENT PLANT

DESCRIPTION: Three 24-inch (61.0 cm) Parshall flumes, each with a water-stage recorder and continuous totalizer, one located at the international boundary for measuring effluent from Nogales, Sonora, one located at the head of the treatment plant, and one in the plant effluent line. Nogales International Treatment Plant is located adjacent to I-19, approximately 9 miles (14.5 km) north of the international boundary, all within the city of Nogales, Santa Cruz County, Arizona.

RECORDS: Flows from the United States are deduced from total plant influent less the flows measured crossing the international boundary from Mexico. Records available: Continuous monthly record for plant influent since August 1951; daily records for plant influent, January 1952 through 1989.

REMARKS: Prior to December 18, 1971 the plant was located along the right bank of Nogales Wash, approximately two miles (3.2 km) north of the international boundary. Nogales International Treatment Plant treats combined sewage from both Nogales, Arizona and Nogales, Sonora by means of aerated stabilization lagoons with a capacity of 8.2 mgd. Chlorinated plant effluent is discharged directly to the Santa Cruz River.

	Total Monthly Flows			Mean Daily Flows-Millions of Gallons Per Day					
	Millions of Gallons			Current Year 1989			Period 1952-1989		
Month	U.S.	Mexico	Total	Maximum	Minimum	Mean	Maximum	Minimum	Mean
Jan.	119.811	169.802	289.613	11.181	8.144	9.342	13.508	0.650	4.145
Feb.	108.285	153.280	261.565	10.147	8.467	9.342	14.706	.650	4.321
Mar.	116.384	168.252	284.636	10.858	8.467	9.182	18.861	.750	4.289
Apr.	100.626	162.036	262.662	9.372	8.079	8.755	11.335	.700	4.087
May	101.388	163.926	265.314	9.695	7.303	8.559	9.695	.550	3.873
June	89.373	129.792	219.165	8.273	6.334	7.306	9.006	.700	3.632
July	82.836	137.558	220.394	8.337	5.881	7.190	13.667	.700	3.845
Aug.	91.831	172.384	264.215	10.276	7.368	8.523	13.120	.750	4.254
Sept.	120.786	169.473	290.259	10.276	8.984	9.675	12.312	.800	4.511
Oct.	119.741	234.374	354.115	20.165	9.242	11.423	20.165	.700	4.453
Nov.	140.572	172.569	313.141	10.987	9.695	10.438	10.987	.800	4.302
Dec.	126.660	185.832	312.492	10.987	9.242	10.080	15.605	.350	4.297
Yearly	1,318.293	2,019.278	3,337.571	20.165	5.881	9.151	20.165	0.350	4.167

RAINFALL ON THE SANTA CRUZ RIVER WATERSHED
IN INCHES

Tabulated below are the monthly records of rainfall with averages for their periods of record at stations located in Arizona. Two stations are operated and maintained by the United States Section of the Commission and two by the National Weather Service. For location, elevation, period of record, type of gage in use, and the observer, see alphabetical listing of stations on this page.

IN THE UNITED STATES

Month	San Rafael #2, Arizona		Canelo, Arizona		Patagonia, Arizona		Nogales Sanitation Plant 9N, Arizona			
	1989	Average 1973-1989	1989	Average 1930-1989	1989	Average 1930-1989	1989	Average 1953-1989		
Jan.	1.75	1.63	1.06	1.20	0.84	1.26	1.34	1.16		
Feb.	.33	1.26	.28	1.05	.11	1.06	.09	.76		
Mar.	.84	1.23	.66	.86	1.05	.93	1.00	.88		
Apr.	0	.56	0	.42	0	.40	0	.32		
May	0	.18	.47	.15	.08	.18	.10	.23		
June	0	.52	.01	.76	.02	.47	.27	.39		
July	3.35	5.09	3.69	4.15	2.38	4.39	2.38	4.78		
Aug.	3.62	3.75	1.92	4.22	1.95	4.07	3.91	3.90		
Sept.	.92	2.28	.45	1.77	.70	1.78	.08	1.65		
Oct.	4.23	1.60	3.25	1.05	3.86	1.15	3.85	1.43		
Nov.	0	.91	.02	.80	.12	.80	.35	.63		
Dec.	.41	1.32	.16	1.38	.70	1.40	.62	1.42		
Yearly	15.45	20.33	11.97	17.81	11.81	17.89	13.99	17.55		

LOCATION OF RAINFALL STATIONS ON THE SANTA CRUZ RIVER WATERSHED

The precipitation records of the stations listed alphabetically below begin on the date shown and extend through 1989.

IN THE UNITED STATES

NAME OF STATION	TYPE GAGE	LATITUDE	LONGITUDE	ELEV. (FT.)	RECORD BEGAN	OBSERVER
Canelo, Arizona	S	31° 33'	110° 32'	5,010	1930	R. E. Ewing
Nogales Sanitation Plant 9N, Arizona	S	31° 25'	110° 57'	3,560	June 1952	I. B. & W. C.
Patagonia, Arizona	S	31° 33'	110° 45'	4,190	1930	George R. Proctor
San Rafael #2, Arizona	S	31° 22'	110° 38'	4,860	Jan. 1973	I. B. & W. C.

S Standard 8" rain gage

TEMPERATURE IN THE SANTA CRUZ RIVER BASIN
IN DEGREES FAHRENHEIT

Tabulated below are monthly records of temperature at the station located at the Nogales Sanitation Plant in Arizona 9 miles (14.5 km) north of the international boundary. On December 18, 1971, the station was moved to correspond with a new Nogales Sanitation Plant. Prior to this date, the station was located 2 miles (3.2 km) north of the international boundary at the old Nogales Sanitation Plant. This station is operated and maintained by the United States Section of the Commission. The equipment at the Nogales Sanitation Plant - 9N consists of a standard 8-inch (203 mm) rain gage and maximum and minimum thermometer. The collection of data for mean relative humidity, evaporation, and mean wind speed was discontinued in 1984.

For specific location of this station, refer to data opposite same station name shown in "Location of Rainfall Stations," in this bulletin.

	Nogales Sanitation Plant - 9N		
	1989		
Month	Mean	Max.	Min.
Jan.	43.5	73	14
Feb.	51.5	85	21
Mar.	57.6	93	24
Apr.	63.8	99	30
May	67.2	102	35
June	75.4	108	44
July	82.6	106	60
Aug.	79.7	102	49
Sept.	74.3	98	42
Oct.	63.4	91	26
Nov.	53.5	84	20
Dec.	45.9	79	17
Yearly	63.2	108	14